Military Deployment
Periodic Occupational and Environmental Monitoring Summary (POEMS): Camp Bala Hissar, Afghanistan: 2011 to 2014

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) 0017-12, (References 1-3).

PURPOSE: This POEMS documents the Department of Defense (DoD) assessment of occupational and environmental health (OEH) risks for Camp Bala Hissar, Afghanistan. It presents a qualitative summary of health risks identified at these locations and their potential medical implications. The report is based on information collected from July 2011 to June 2014 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 Camp Bala Hissar 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 July 2011 to June 2014.

The POEMS can be useful to inform healthcare providers and others of environmental health conditions experienced by individuals deployed to Camp Bala Hissar 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 records on a Standard Form (SF) 600 (Chronological Record of Medical Care).

SITE DESCRIPTION: Camp Bala Hissar is located in Kabul, Afghanistan. Kabul is situated 5,900 feet above sea level in a narrow valley and along the Kabul River. Camp Bala Hissar is named after the 5th century fortress that overlooks it. The basecamp was within a larger Afghan National Army camp. The basecamp was surrounded by a densely populated part of the Southwest Kabul.

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 Camp Bala Hissar. 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.

POEMS
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 Camp Bala Hissar, AFG:

Food/waterborne diseases (e.g., bacterial diarrhea, hepatitis A, typhoid/paratyphoid fever, diarrhea-cholera, diarrhea-protozoal, brucellosis, hepatitis E); other endemic diseases (malaria, cutaneous leishmaniasis-acute, leishmaniasis-visceral, Crimean-Congo hemorrhagic fever, sandfly fever, scrub typhus (mite-borne), leptospirosis, Tuberculosis (TB), rabies, Q fever, soil transmitted helminthes (hookworm, strongyloidiasis, cutaneous larva migrans); heat stress; and continuous noise. 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 (malaria, cutaneous leishmaniasis-acute, leishmaniasis-visceral, Crimean-Congo hemorrhagic fever, sandfly fever, scrub typhus (mite-borne)), 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) 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 soil transmitted helminthes (hookworm, strongyloidiasis, cutaneous larva migrans), risk may have been reduced by limiting exposure to soil contaminated with human or animal feces (including not sleeping on bare ground, and not walking barefoot). 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, and those under operational constraints (equipment, PPE, vehicles). Risks from heat stress may have been reduced with preventive medicine controls, work-rest cycles, proper hydration and nutrition, and mitigation. For continuous noise, risk is high to individuals working near major noise sources (e.g., flightlines, power production) without proper hearing protection.

Air quality: For inhalable coarse particulate matter less than 10 micrometers in diameter (PM_{10}) from environmental dust (including burn pits), the PM_{10} overall short-term health risk was not evaluated due to insufficient data for analysis. For inhalable fine particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$) from environmental dust (including burn pits), the $PM_{2.5}$ overall short-term health risk was not evaluated due to insufficient data for analysis. However, the Camp Bala Hissar and vicinity area is a dust-prone desert environment, also subject to vehicle traffic. Consequently, 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. A burn pit was present at Camp Bala Hissar and vicinity, and burn pits might have existed elsewhere (e.g., burn pits used by the local population); however, the PM_{10} and the $PM_{2.5}$ overall short-term health risks specifically for burn pits were not evaluated due to no environmental samples collected near burn pits provided for analysis– see Section 10.8. Where burn pits exist, exposures may vary, and exposures to high levels of PM_{10} and $PM_{2.5}$ from smoke may 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. 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 while at Camp Bala Hissar and vicinity. Personnel who reported with symptoms or required treatment while at site(s) with burn pit activity 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 chronic health effects in some personnel during deployment at Camp Bala Hissar, AFG:

For continuous noise, risk is 'High' to individuals working near major noise sources (e.g., flightlines, power production) without proper hearing protection. Risk may have been reduced to personnel working near major noise sources (e.g.,

operations around sources of continuous noise such as flight lines, landing zones, and power production/generators) by wearing proper hearing protection. 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.

Air quality: For inhalable fine particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$) from environmental dust (including burn pits), the overall long-term health risk was not evaluated due to insufficient data for analysis. Inhalable coarse particulate matter less than 10 micrometers in diameter (PM_{10}) from environmental dust (including burn pits) was not evaluated for long-term health risk due to insufficient data for analysis and no available health guidelines. However, the Camp Bala Hissar and vicinity area is a dust-prone desert environment, also subject to vehicle traffic, and conditions may have varied. A burn pit was present at Camp Bala Hissar and vicinity, and burn pits might have existed elsewhere (e.g., burn pits used by the local population); however, the PM_{10} and the $PM_{2.5}$ overall long-term health risks specifically for burn pits were not evaluated due to no environmental samples collected near burn pits provided for analysis– see Section 10.7. However, burn pit exposures may vary, as conditions may have varied. For inhalational exposure to high levels of dust containing PM_{10} and $PM_{2.5}$, such as during high winds or dust storms, and for exposures 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 – Camp Bala Hissar, AFG [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: Data not representative of exposure and is insufficient to characterize risk. 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/pre-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: Data not representative of exposure and is insufficient to characterize risk. 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/pre-existing respiratory diseases).
	Long-term: No health guidelines and insufficient data were available for health risk analysis.		Long-term: No health guidelines and insufficient data were available for health risk analysis.
Particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$)	Short-term: Data not representative of exposure and is insufficient to characterize risk. 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/pre-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: Data not representative of exposure and is insufficient to characterize risk. 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/pre-existing respiratory diseases).
	Long-term: Data not representative of exposure and is insufficient to characterize risk. A small percentage of personnel may be at increased risk		Long-term: Data not representative of exposure and is insufficient to characterize risk. A small percentage of personnel may be at increased risk

Source of Identified Health Risk[3]	Unmitigated Health Risk Estimate[4]	Control Measures Implemented	Residual Health Risk Estimate[4]
	for developing chronic conditions, particularly those more susceptible to acute effects (e.g., those with asthma/pre-existing respiratory diseases).		for developing chronic conditions, particularly those more susceptible to acute effects (e.g., those with asthma/pre-existing respiratory diseases).
ENDEMIC DISEASE			
Food borne/Waterborne (e.g., diarrhea-bacteriological)	Short-term: High (Bacterial diarrhea, Hepatitis A, Typhoid fever) to Moderate (Diarrhea-protozoal Brucellosis, Hepatitis E, Diarrhea-cholera) to Low (Polio). If ingesting local food/water, 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: Not an identified source of health risk.		Long-term: No data available
Arthropod Vector Borne	Short-term: High (Malaria, Crimean-Congo hemorrhagic fever) to Moderate (Leishmaniasis-cutaneous, Leishmaniasis- visceral, Sandfly fever, Typhus-miteborne) to Low (West Nile fever, Plague).	Preventive measures include proper wear of treated uniform, application of repellent to exposed skin and bed net use.	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.	Recreational swimming in surface waters not likely in this area of Afghanistan during this time period.	Short-term: Low to none for Leptospirosis.
	Long-term: No data available		Long-term: No data available
Respiratory	Short-term: Moderate [(Tuberculosis (TB)], Low (Meningococcal meningitis, MERS-CoV).	Providing adequate work and living space, medical screening, and vaccination.	Short-term: Low to none
	Long-term: No data available		Long-term: No data available
Animal Contact	Short-term: Moderate (Q-fever, Rabies), Low (Anthrax, Avian Influenza).	Prohibiting contact with, adoption, or feeding of feral animals in accordance with (IAW) U.S. Central Command (CENTCOM) General Order (GO) 1C. 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: Low to none
	Long-term: Low (Rabies)		Long-term: No data available
Soil-transmitted	Short-term: Moderate for soil transmitted helminthes (hookworm, strongyloidiasis, cutaneous larve migrans).	Risk was reduced to low by limiting exposure to soil contaminated with human or animal feces (including	Short-term: Low

Source of Identified Health Risk[3]	Unmitigated Health Risk Estimate[4]	Control Measures Implemented	Residual Health Risk Estimate[4]
		sleeping on bare ground and walking barefoot).	
	Long-term: No data available		Long-term: No data available
VENOMOUS ANIMAL/ INSECTS			
Snakes, scorpions, and spiders	Short-term: Low, if encountered, effects of venom vary with species from mild localized swelling to potentially lethal effects.	Risk reduced by avoiding contact, proper wear of the uniform (especially footwear), and timely treatment.	Short-term: Low, if encountered, effects of venom vary with species from mild localized swelling to potentially lethal effects.
	Long-term: Not an identified source of health risk.		Long-term: No data available
HEAT/COLD STRESS			
Heat	Short-term: High to Low. Risk can be greater during months of May through September and greater for unacclimated personnel.	Work-rest cycles, proper hydration and nutrition, and Wet Bulb Globe Temperature (WBGT) monitoring.	Short-term: Low. Risk can be greater during months of June through September and greater for unacclimated personnel.
	Long-term: Low; However, the health 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.		Long-term: 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	Risks from cold stress reduced with protective measures such as use of the buddy system, limiting exposure during cold weather, proper wear of issued protective clothing, and proper nutrition and hydration.	Short-term: Low risk of cold stress/injury.
	Long-term: Low; Long-term health implications from cold injuries were rare but could occur, especially from more serious injuries such as frostbite.		Long-term: Low; Long-term health implications from cold injuries were rare but could occur, especially from more serious injuries such as frostbite.
NOISE			
Continuous (Flightline, Power Production)	Short-term: High to Low; High risk to individuals working near major noise sources without proper hearing protection.	Hearing protection used by personnel in higher risk areas.	Short-term: Low risk to the majority of personnel and to individuals working near major noise sources who use proper hearing protection.
	Long-term: High to Low; High risk to individuals working near major noise sources without proper hearing protection.		Long-term: Low risk to the majority of personnel and to individuals working near major noise sources who use proper hearing protection.
UNIQUE INCIDENTS/ CONCERNS			

Source of Identified Health Risk[3]	Unmitigated Health Risk Estimate[4]	Control Measures Implemented	Residual Health Risk Estimate[4]
Burn Pits	Camp Bala Hissar had a temporary burn pit from 26 March 2014 to 15 April 2014. Data not representative of exposure and is insufficient to characterize risk. Short-term health effects could have included eye, nose, throat, and lung irritation. More serious effects were possible in susceptible persons (e.g., those with asthma/pre-existing respiratory diseases).	Control measures may have included locating burn pits downwind of prevailing winds, increased distance from living and working areas when possible, and improved waste segregation and management techniques.	Long-term: Not evaluated-no available health guidelines for PM_{10}. Data not representative of exposure and is insufficient to characterize long-term health risk for $PM_{2.5}$ or other potential hazards.

[1] This Summary Table provides a qualitative estimate of population-based short- and long-term health risks associated with the general ambient and occupational environment conditions at Camp Bala Hissar. It does not represent a unique individual exposure profile. Actual individual exposures and health effects depend on many variables. For example, while a chemical may be present in the environment, if a person does not inhale, ingest, or contact a specific dose of the chemical for adequate duration and frequency, then there may be no health risk. Alternatively, a person at a specific location may experience 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 July 2011 to June 2014. 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 Camp Bala Hissar. The health risks are presented as Low, Moderate, High or Extremely High for both short- and long-term 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 Army Public Health Center (APHC). Where applicable, "None Identified" is used when a potential exposure was identified, no health risk of either a specific short- or long-term health effects were determined. More detailed descriptions of OEH exposures that were 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 Camp Bala Hissar, AFG 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* (Reference 4). 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.

The ProUCL version 5.0 software package was used for statistical analyses (Reference 10). Means are followed by standard deviation (SD). Risk characterization was based on the 95 percent upper confidence level of the arithmetic mean (95% UCL) or the arithmetic mean depending on the quality and quantity of the data being evaluated. The sample mean is an uncertain estimate of the true mean of the population exposure point concentration (PEPC). The 95% UCL reduces the uncertainty inherent in the sample mean and states with a higher level of confidence that the mean PEPC is no greater than the 95% UCL.

2 Air

2.1 Site-Specific Sources Identified

Personnel deployed to Camp Bala Hissar were exposed to various airborne contaminants as identified by monitoring and sampling efforts between July 2011 to June 2014. Sources of airborne contaminants at the base camp included diesel vehicle and generator exhaust, and dust from unpaved roads and surfaces. In addition, dust storms and periods of high winds contributed to particulate matter (PM) exposures above health-based MEGs at Camp Bala Hissar.

2.2 Particulate Matter, less than 10 micrometers (PM_{10})

2.2.1 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.

2.2.2 Sample data/Notes:

There was one PM_{10} sample from Camp Bala Hissar. The 24-hour PM_{10} concentration was 112 $\mu g/m^3$.

2.2.3 Short-term and long-term health risks:

Not Evaluated.

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

2.3.1 Exposure Guidelines:

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

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

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

- Negligible MEG = 15
- Marginal MEG = 65

2.3.2 Sample data/Notes:

Five valid $PM_{2.5}$ samples were collected in 2011 (one sample), 2012 (one sample), 2013 (one sample) and 2014 (two samples). The range of 24-hour $PM_{2.5}$ concentrations was 12 $\mu g/m^3$ to 92 $\mu g/m^3$ with an average concentration of 51 $\mu g/m^3$, SD=29. The data were not representative of annual exposure and were insufficient to characterize the potential short-term and long-term health risks from $PM_{2.5}$ exposure to U.S. personnel.

2.3.3 Short-term and long-term health risks:

Not Evaluated.

2.4 Airborne Metals from PM_{10} and $PM_{2.5}$

2.4.1 Samples data/Notes:

There were no PM_{10} airborne metal samples. All airborne metals from $PM_{2.5}$ were below their respective MEGs.

2.5 Volatile Organic Compounds (VOC)

The likely sources of VOCs on Camp Bala Hissar were fuel storage, fuel transfers between storage tanks, and vehicle and aircraft emissions.

2.5.1 Sample data/Notes:

Two valid VOCs air samples were collected at Camp Bala Hissar in October 2013. There were no sampling data for 2011, 2012 and 2014.

2.5.2 Short-term and long-term health risks:

The data were not representative of annual exposure and were insufficient to characterize the potential short-term and long-term health risks from VOCs exposure to U.S. personnel. However, all VOCs parameters were below their respective MEGs.

3 Soil

3.1 Site-Specific Sources Identified

3.1.1 Sample data/Notes:

Three valid soil samples were collected at Camp Bala Hissar in October 2011 (two samples) and October 2013 (one sample). The three discrete samples were taken at the fuel point and the volleyball court. There were no sampling data for 2012 and 2014.

The primary soil contamination exposure pathways are via 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 (i.e., Total petroleum hydrocarbons (TPH) and polycyclic aromatic hydrocarbons (PAH) near fuel spills). For the risk assessment, personnel are assumed to remain at this location for 6 months to 1 year.

3.1.2 Short-term health risk:

Currently, sampling data for soil are not evaluated for short-term (acute) health risks.

3.1.3 Long-term health risk:

No parameters exceeded the 1-year Negligible MEGs.

4 Water

In order to assess the risk to U.S. personnel from exposure to water in theater, the Army Public Health Center (APHC) identified the most probable exposure pathways based on available information. The water exposures considered were the ingestion of water used for drinking and the use of water for non-drinking purposes (such as personal hygiene or showering).

4.1 Drinking Water

4.1.1 Site-Specific Sources Identified

Water is delivered to the basecamp by water trucks. There were no drinking water samples for Camp Bala Hissar.

4.1.2 Short-term and long-term health risks:

Not evaluated because drinking water samples were not available.

4.2 Water: Used for Other Purposes (Personal Hygiene, Showering, etc.)

Water is delivered to the basecamp by water trucks for non-drinking purposes (i.e., personal hygiene, showering, etc.).

4.2.1 Sample data/Notes:

Nine valid water samples representing non-drinking water were collected in 2010 (four samples), 2013 (three samples) and 2014 (two samples).

4.2.2 Short-term and long-term health risks:

The data were not representative of exposure and were insufficient to characterize the potential short-term and long-term health risks from non- drinking water exposure to U.S. personnel. All detected chemicals from collected samples were below the 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 Defense Occupational and Environmental Health Readiness System (DOEHRS) or the Military Exposure Surveillance Library (MESL) from July 2011 to June 2014 timeframe (References 1 and 12).

5.2 Depleted Uranium (DU):

No specific hazard sources were documented in the DOEHRS or the MESL from July 2011 to June 2014 timeframe (References 1 and 12).

5.3 Ionizing Radiation:

No specific hazard sources were documented in the DOEHRS or the MESL from July 2011 to June 2014 timeframe (References 1 and 12).

5.4 Non-Ionizing Radiation:

No specific hazard sources were documented in the DOEHRS or the MESL from July 2011 to June 2014 timeframe (References 1 and 12).

6 Endemic Diseases[1]

This document lists the endemic diseases reported in the region, its specific health risks and severity and general health information about the diseases. CENTCOM Modification (MOD) 12 (Reference 13) lists deployment requirements, to include immunizations and chemoprophylaxis, in effect during the timeframe of this POEMS.

6.1 Foodborne and Waterborne Diseases

Foodborne 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 disease surveillance has been improved to cover the majority of the

country since 2009. There is still underreporting of specific disease incidence. 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: Unmitigated health risk to U.S. personnel was high year round. 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.

6.1.2 Hepatitis A, and Typhoid/paratyphoid fever
High, mitigated to Low: Unmitigated health risk to U.S. personnel is high year round for hepatitis A and typhoid/paratyphoid fever. 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 considered a moderate risk include: diarrhea-protozoal, hepatitis E, diarrhea-cholera, and brucellosis.

6.1.3 Polio
Low: Unmitigated health risk to U.S. personnel is low. Despite a concerted global eradication campaign, poliovirus continues to affect children and adults in Afghanistan . Polio is a highly infectious disease that invades the nervous system. The virus is transmitted by person-to-person, typically by hands, food or water contaminated with fecal matter or through direct contact with the infected person's saliva. An infected person may spread the virus to others immediately before and about 1 to 2 weeks after symptoms appear. The virus can live in an infected person’s feces for many weeks. About 90% of people infected have no symptoms, and about 1% have a very severe illness leading to muscle weakness, difficulty breathing, paralysis, and sometimes death. People who do not have symptoms can still pass the virus to others and make them sick.

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

6.1.5 Long-term health risk:
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. Malaria, the major vector-borne health risk in Afghanistan, is capable of debilitating a high percentage of personnel for up to a week or more. 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

High, mitigated to Low: Unmitigated health risk to U.S. personnel is high with season transmission (April-November). Malaria incidents are often associated with the presence of agriculture activity, including irrigation systems and standing water, which provide breeding habitats for vectors. A small number of cases may occur among personnel exposed to mosquito (Anopheles spp.) bites. Malaria incidents may cause debilitating febrile illness typically requiring 1 to 7 days of inpatient care, followed by return to duty. Severe cases may require intensive care or prolonged convalescence.

6.2.2 Crimean-Congo hemorrhagic fever

High, mitigated to Low: Unmitigated health risk to U.S. personnel was high year round with peak transmission March-November. Crimean-Congo hemorrhagic fever occurs in a small number of cases (less than 1% per month attack rate) 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%.

6.2.3 Leishmaniasis

Moderate, mitigated to Low: Unmitigated health risk to U.S. personnel is moderate with seasonal transmission (March-November). Leishmaniasis is transmitted by sandflies. A small number of cases (less than 1% per month attack rate) could occur among personnel exposed to sandfly bites in areas with infected people, rodents, dogs, or other reservoir animals. In groups of personnel exposed to heavily infected sandflies in focal areas, attack rates can be very high (over 50%). 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.

6.2.4 Sandfly fever

Moderate, mitigated to Low: Unmitigated health risk to U.S. personnel was moderate with seasonal transmission (March-November). The disease is transmitted by sandflies, which typically bite at night and breed in dark places rich in organic matter, particularly in rodent or other animal burrows. Rare cases are possible. Although data are insufficient to assess potential disease rates, 1% to 10% of personnel could be affected per month; under worst conditions disease rates can be as high as 50% with no mitigation measures in place. Incidents can result in debilitating febrile illness typically requiring 1 to 7 days of supportive care followed by return to duty

6.2.5 Typhus-miteborne (scrub typhus)

Moderate, mitigated to Low: Unmitigated health risk to U.S. personnel is moderate with seasonal transmission (March-November). Miteborne typhus is a significant cause of febrile illness in local populations with rural exposures in areas where the disease is endemic. Large outbreaks have

occurred when non-indigenous personnel such as military forces enter areas with established local transmission. The disease is transmitted by the larval stage of trombiculid mites (chiggers), which are typically found in areas of grassy or scrubby vegetation, often in areas which have undergone clearing and regrowth. Habitats may include sandy beaches, mountain deserts, cultivated rice fields, and rain forests. Although data are insufficient to assess potential disease rates, attack rates can be very high (over 50%) in groups of personnel exposed to heavily infected "mite islands" in focal areas. The disease can cause debilitating febrile illness typically requiring 1 to 7 days of inpatient care, followed by return to duty.

6.2.6 West Nile fever

Low: Unmitigated health risk to U.S. personnel was low year with seasonal transmission (March-November). West Nile fever was present and maintained by the bird population and mosquitoes that help to transfer the diseases from birds to humans. The majority of infections in young, healthy adults are asymptomatic although it can result in fever, headache, tiredness, and body aches, occasionally with a skin rash (on the trunk of the body) and swollen lymph glands. West Nile fever is a febrile illness typically requiring 1-7 days of inpatient care followed by return to duty; convalescence may be prolonged.

6.2.7 Plague

Low: Unmitigated health risk to U.S. personnel is low year round. Bubonic plague typically occurred as sporadic cases among people who come in contact with wild rodents and their fleas during work, hunting, or camping activities. Outbreaks of human plague are rare and typically occur in crowded urban settings associated with large increases in infected commensal rats (Rattus rattus) and their flea populations. Some untreated cases of bubonic plague may develop into secondary pneumonic plague. Respiratory transmission of pneumonic plague is rare but has the potential to cause significant outbreaks. Close contact is usually required for transmission. In situations where respiratory transmission of plague is suspected, weaponized agent must be considered. Extremely rare cases (less than 0.01% per month attack rate) could occur. Incidence could result in potentially severe illness which may require more than 7 days of hospitalization and convalescence.

6.2.8 Short-term health risk:

Low: The overall short-term unmitigated health risk associated with arthropod vector-borne diseases at Camp Bala Hissar was considered high (malaria, Crimean-Congo hemorrhagic fever), moderate (sandfly fever, leishmaniasis (cutaneous and visceral), typhus-miteborne (scrub typhus), and low (West Nile fever, plague). Preventive measures such as proper wear of treated uniforms and application of repellent to exposed skin reduced the health risk to low to none for arthropod vector-vector borne diseases. Confidence in the risk estimate was medium.

6.2.9 Long-term health risk:

Low: The unmitigated risk is moderate for leishmaniasis-visceral (chronic). Risk was 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

Operations or activities that involve extensive water contact may result in personnel being temporarily debilitated with leptospirosis in some locations. Leptospirosis health 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 exposures to enteric diseases such as 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 such as 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: Unmitigated health risk to U.S. personnel was moderate with seasonal transmission (March-November). Human infections occur 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, *Leptospira* present in the soil passes directly into surface waters. *Leptospira* 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.

6.3.2 Short-term health risk:

Low: The overall short-term unmitigated health risk associated with water contact diseases at Camp Bala Hissar was considered moderate (leptospirosis). Preventive measures such as avoiding water contact and recreational water activities; and protective coverings for cuts/abraded skin reduced the health risk to low to none. Confidence in the risk estimate was medium.

6.3.3 Long-term health risk:

None identified based on available data. Confidence in the risk estimate was medium.

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: Unmitigated health risk to U.S. personnel was moderate year round. Tuberculosis (TB) is usually transmitted through close and prolonged exposure to an active case of pulmonary or laryngeal TB, but can also occur with incidental contact. Individuals with prolonged indoor exposure to the local population are at increased risk for latent TB infection.

6.4.2 Meningococcal meningitis

Low: Unmitigated health risk to U.S. personnel was low year round. Meningococcal meningitis is transmitted from person to person through droplets of respiratory or throat secretions. Risk is comparable to the U.S. among unvaccinated personnel who have close contact with the local population. Close and prolonged contact facilitates the spread of this disease. Meningococcal meningitis is a potentially very severe disease typically requiring intensive care; fatalities may occur in

5-15% of cases.

6.4.3 Middle East respiratory syndrome coronavirus (MERS-CoV)
Low: Although no cases have been reported in Afghanistan, Middle East respiratory syndrome coronavirus (MERS-CoV) is known to occur within the region. Most MERS patients developed severe acute respiratory illness with symptoms of fever, cough and shortness of breath. MERS-CoV has spread from ill people to others through close contact, such as caring for or living with an infected person. The incubation period for MERS-CoV is usually about 5 to 6 days, but can range from 2 to 14 days. Currently, there is no vaccine to prevent MERS-CoV infection.

6.4.4 Short-term health risk:
Low: The overall short-term unmitigated health risk associated with respiratory diseases at Camp Bala Hissar was considered moderate (TB) and low (meningococcal meningitis and MER-CoV). Preventive measures such as vaccination and routine medical screenings reduced the health risk to low to none. Confidence in the risk estimate was medium.

6.4.5 Long-term health risk:
None identified based on available data. TB was evaluated as part of the post deployment health assessment (PDHA). A TB skin test was required post-deployment if potentially exposed and was based upon individual service policies.

6.5 Animal-Contact Diseases

6.5.1 Q-Fever
Moderate, mitigated to Low: Unmitigated health risk to U.S. personnel was moderate year round. Rare cases were possible among personnel exposed to aerosols from infected animals, with clusters of cases possible in some situations. Significant outbreaks (affecting 1-50%) could 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. Q-Fever is a debilitating febrile illness, sometimes presenting as pneumonia, typically requiring 1 to 7 days of inpatient care followed by return to duty. Mitigation strategies include consuming approved food sources, avoidance of animals and farms, dust abatement when working in these areas (wet mop, water sprayed on high volume traffic areas, etc.), and proper PPE for personnel working with animals, and immunization.

6.5.2 Rabies
Moderate, mitigated to Low: Unmitigated health risk to U.S. personnel was moderate year round. Dogs were the primary reservoir of rabies in Afghanistan, 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. A U.S. Army Soldier deployed to Afghanistan from May 2010 to May 2011 died of rabies in New York on 31 August 2011 (Reference 8). Laboratory results indicated the Soldier was infected from contact with a dog while deployed. 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 1C, reduction of animal habitats, active pest management programs, and timely treatment of feral animal scratches/bites.

6.5.3 Anthrax
Low: Unmitigated health risk to U.S. personnel was low year round. 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 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.

6.5.4 Avian Influenza

Low: Unmitigated health risk to U.S. personnel was low year round. Although 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 risk:

Low to None: The overall short-term unmitigated health risk associated with animal contact diseases at Camp Bala Hissar was considered moderate (Q-fever and rabies) to low (anthrax and avian influenza). Preventive measures such as consuming approved food source, immunization and avoidance of animals and farms reduced the health risk to low to none. Confidence in risk estimate was medium.

6.5.6 Long-term health risk:

Low: The long-term risk for rabies is low because the incubation period for rabies can be several years in rare cases.

6.6 Soil-transmitted helminths (hookworm, strongyloidiasis, cutaneous larva migrans)

Moderate, mitigated to Low: Unmitigated health risk to U.S. personnel was moderate with seasonal transmission (March-November). A small number of cases (less than 1% per month attack rate) could occur among personnel with direct skin exposure to soil contaminated with human or animal feces (including sleeping on bare ground and walking barefoot). Initial skin symptoms typically are mild and are not debilitating. However, systemic symptoms of fever, cough, abdominal pain, nausea, and diarrhea may develop weeks to months after initial infection with hookworm or *Strongyloides*. More severe infections with high worm burden may be debilitating in some cases. Rates of infection in U.S. personnel will be highly variable, depending on specific local environmental conditions. Rates of infection in U.S. personnel are expected to be less than 1 percent per month in most locations. However, rates in some focal areas with heavily contaminated soil could exceed 1 percent per month.

6.6.1 Short-term health risk:

Low: Moderate for soil transmitted helminthes. Overall risk was reduced to low with mitigation measures. Confidence in the health risk estimate is high.

6.6.2 Long-term health risk:

None identified based on available data.

7 Venomous Animal/Insect

All information was taken directly from the Armed Forces Pest Management Board (Reference 14) and the Clinical Toxinology Resources web site from the University of Adelaide, Australia (Reference 15). The species listed below have home ranges that overlap the location of Camp Bala Hissar, and may present a health risk if they are encountered by personnel. See Section 10.3 for more

information about pesticides and pest control measures.

7.1 Spiders

- *Latrodectus dahlia* (widow spider): Severe envenoming possible, potentially lethal. However, venom effects are mostly minor and even significant envenoming is unlikely to be lethal.

7.2 Scorpions

- *Androctonus afghanus, Androctonus amoreuxi,* and *Androctonus baluchicus*: Severe envenoming possible, potentially lethal. Severe envenoming may produce direct or indirect cardio toxicity, with cardiac arrhythmias, cardiac failure. Hypovolaemic hypotension possible in severe cases due to fluid loss through vomiting and sweating.

- *Afghanobuthus nuamanni, Buthacus striffleri*, *Compsobuthus afghanus*, *Compsobuthus rugosulus, Compsobuthus tofti*, *Mesobuthus caucasicus, Mesobuthus eupeus, Mesobuthus macmahoni, Orthochirus afghanus*, *Orthochirus bicolor, Orthochirus danielleae, Orthochirus erardi*, *Orthochirus heratensis, Orthochirus Jalalabadensis, Orthochirus monodi, Orthochirus pallidus, Orthochirus samrchelsis*, *Orthochirus scrobiculosus,* and *Sassanidotus gracilis*: 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 these species fit within that spectrum.

- *Hottentotta alticola* and *Hottentotta saulcyi*: Moderate envenoming possible but unlikely to prove lethal. Stings by these scorpions are likely to cause only short lived local effects, such as pain, without systemic effects.

- *Scorpiops afghanus* and *Scorpiops lindbergi*: Mild envenoming only, not likely to prove lethal. Stings by these scorpions are likely to cause only short lived local effects, such as pain, without systemic effects.

7.3 Snakes

- *Echis carinatus multisquamatus* (central Asian saw-scaled viper), *Echis carinatus sochureki* (Sochurek's saw-scaled viper), and *Gloydius halys* (Haly's Pit Viper): Severe envenoming possible, potentially lethal. Bites may cause moderate to severe coagulopathy and haemorrhagins causing extensive bleeding.

- *Eristocophis mcmahoni* (McMahon's Viper): Severe envenoming possible, potentially lethal. Venom shows strong hemorrhagic activity. Mild to Moderate neurotoxic effects may occur.

- *Macrovipera lebetina obtuse* (Levantine Viper), and *Macrovipera lebetina turanica* (Levantine Viper): Severe envenoming possible, potentially lethal. Bites may cause mild to severe local effects, shock and coagulopathy.

- *Naja oxiana* (Oxus cobra): Severe envenoming possible, potentially lethal. Bites can cause systemic effects, principally flaccid paralysis.

- *Pseudocerastes persicus* (Persian dwarf snake): Unlikely to cause significant envenoming; limited clinical data suggest bites result in local effects only.

- *Bungarus caeruleus* (Common krait): Severe envenoming likely, high lethality potential. Krait

bites can cause moderate to severe flaccid paralysis, respiratory failure, requiring intubation & ventilation in severe cases. Most victims bitten while asleep in huts at night. Bites may produce invisible or barely perceptible puncture marks. Human mortality rate is high without use of antivenom. Antivenom may prevent worsening of paralysis, but may not reverse established paralysis.

- *Gloydius himalayanus* (Himalayan pit viper), and *Gloydius intermedius* (Central Asian pit viper): Potentially lethal envenoming, though unlikely, cannot be excluded. Bites cause in local and sometimes systemic effects including necrosis, coagulopathy, and renal failure.

7.4 Short-term health risk:
Low: If encountered, effects of venom vary with species from mild localized swelling (e.g. widow spider) to potentially lethal effects (e.g., Haly's Pit Viper). 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 4, Table 3-6).

7.5 Long-term health risk:
None identified.

8 Heat/Cold Stress

Camp Bala Hissar is located in Kabul, Afghanistan. Kabul has a cold, and semi-arid climate. Between May and September, the average daily maximum temperature reached the low 90s degrees Fahrenheit (ºF), and the high may reach the low 120s ºF. In winter, the average temperature was in the mid-50s ºF, and the temperature occasionally dropped below freezing. The mean annual average precipitation was 3.5 inches, with the majority of the recorded precipitation occurring in February and March. Heat stress/injuries and cold stress/injuries are largely dependent on operational and individual factors instead of environmental factors alone (Reference 16).

8.1 Heat

8.1.1 Short-term health risk:
High, mitigated to Low: The short-term health risk of heat injury was high in unacclimated personnel. Preventive measures such as work-rest cycles and proper hydration reduced the health risk to low.

8.1.2 Long-term health risk:
Low: The long-term health 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. Long-term health implications from heat injuries were rare but could occur–especially from more serious heat injuries such as heat stroke. It was possible that high heat in conjunction with various chemical exposures could increase long-term health risks, though specific scientific evidence was not conclusive. Confidence in these risk estimates was medium.

8.2 Cold

Short-term and Long-term health risks: The risk of cold injury was low. Confidence in this risk estimate was medium.

9 Noise

9.1 Continuous:

Aircraft operations have the potential to cause significant noise hazard to flight line and helicopter landing zone support personnel. Because of the potential noise hazard inherent in the helicopter landing zone, personnel are required to wear dual hearing protection when working on the flight line.

Personnel residing in close proximity to generators will routinely be exposed to noise levels as high as 82.0 decibels (dB). Although this is below the 85 dB threshold requiring hearing protection, it still presents a concern for hearing conservation.

9.1.1 Short-term health risk:
Low: The short-term risk of noise injury with appropriate hearing protection use is low. Few exposed personnel (if any) are expected to have noticeable health effects during mission.

9.1.2 Long-term health risk:
Moderate to Low: The long-term risk of noise injury with appropriate hearing protection use is low with few exposed personnel (if any) expected to develop delayed onset, irreversible effects. If protective measures are not used, the risk is elevated to moderate and many exposed personnel are plausibly expected to develop delayed onset, irreversible effects.

9.2 Impulse:

No specific hazard sources were documented in the DOEHRS or the MESL from July 2011 to June 2014 timeframe (References 1 and 12).

10 Other Unique Occupational Hazards

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 exposures 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 Fuel/Petroleum Products/Industrial Chemical Spills

No specific hazard sources were documented in the DOEHRS or the MESL from July 2011 to June 2014 timeframe (References 1 and 12).

10.3 Pesticides/Pest Control

Army personnel oversaw pest management. For each pesticide product applied during this period, the EPA approved label has been archived, providing a framework how each pesticide handled and applied. There were no reports that indicated accidents, misuse, misapplication or other hazards associated with pesticides use.

10.4 Waste Sites/Waste Disposal

10.4.1 Hazardous and Non-hazardous Waste

Regulated medical waste was collected in sharp containers and sent to Camp Phoenix for incineration.

Short-term and Long-term health risks: **Low**. Confidence in the risk estimate was medium.

10.4.2 Solid Waste Management

Solid waste was hauled off-site by a local national contractor.

Short-term health risk: **Low**.

Long-term health risk: **Low.**

10.5 General Sanitation

No specific hazard sources were documented in the DOEHRS or the MESL from July 2011 to June 2014 timeframe (References 1 and 12).

10.6 Lead- based Paint

No specific hazard sources were documented in the DOEHRS or the MESL from July 2011 to June 2014 timeframe (References 1 and 12).

10.7 Asbestos

No specific hazard sources were documented in the DOEHRS or the MESL from July 2011 to June 2014 timeframe (References 1 and 12).

10.8 Burn Pits

Camp Bala Hissar lost the solid waste pick up and built a temporary open burn pit. The burn pit was opened on 26 March 2014 and closed on 15 April 2014. The burn pit was approximately 6.5 feet deep, 10 feet wide and 26 feet long. There was one sample taken near the burn pit. The data were not representative of annual exposure and were insufficient to characterize the potential short-term and long-term health risks.

While not specific to Camp Bala Hissar 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 17). The Institute of Medicine committee's (Reference 17) 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.

11 References[2]

1. 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.

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

3. Joint Staff Memorandum (MCM) 0017-12, Procedures for Deployment Health Surveillance, 2012.

4. Base Camp Assessment, Bala Hissar, Afghanistan, 12 November 2013.

5. Base Camp Assessment, Kabul-Bala Hissar, Afghanistan, 02 January 2014.

6. Base Camp Assessment, Bala Hissar, Afghanistan, 01 March 2014.

7. Base Camp Assessment, Bala Hissar, Afghanistan, 20 May 2014.

8. Preventive Medicine Base Camp Assessment, Bala Hissar, 22-24 March 2012.

9. Preventive Medicine Base Camp Assessment, Camp Bala Hissar, 3-4 October 2011.

10. USAPHC TG230, June 2013 Revision, Final Environmental Health Risk Assessment and Chemical Exposure Guidelines for Deployed Military Personnel TG230.

11. Singh, A. and Singh, A.K., 2013. ProUCL Version 5.0. 00 Technical Guide-Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations. *EPA: Washington, WA, USA*.

12. 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.

[2] NOTE. The data are currently assessed using the 2013 TG230 document. The general method involves an initial review of the data which eliminates all chemical substances not detected above 1-yr negligible MEG. 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 and water (soil is only evaluated for long-term risk). This is performed by deriving separate short-term and long-term population exposure level 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 non-drinking 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 to conservatively assess non-drinking uses of water.

13. Modification 12 to United States Central Command Individual Protection and Individual Unit Deployment Policy, 13 December 2013.

14. Armed Forces Pest Management Board: http://www.afpmb.org/content/venomous-animals-country-i#Iraq. U.S. Army Garrison - Forest Glen, Silver Spring, MD.

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

16. Goldman R.F. 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.

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

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 Deputy Assistant Secretary of Defense for Health Readiness Policy and Oversight (HRP&O).
Army Public Health Center 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.med.navy.mil/sites/nmcphc/Pages/Home.aspx
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, Deputy Assistant Secretary of Defense for Health Readiness Policy and Oversight (HRP&O) Phone: (800) 497-6261. http://fhpr.dhhq.health.mil/home.aspx