Military Deployment
Periodic Occupational and Environmental Monitoring Summary (POEMS):
Kabul and vicinity, Afghanistan
Calendar Years: 2017-2018

AUTHORITY: This POEMS has been developed in accordance with Department of Defense Instructions (DoDI) 6490.03, 6055.05 and Joint Chiefs of Staff memorandum (MCM) 0017-12 (References 1-3).

PURPOSE: This POEMS documents the Department of Defense (DoD) assessment of occupational and environmental health (OEH) risk for Kabul and vicinity that includes Camp Eggers, Camp Phoenix, Camp Kabul Headquarters – International Security Assistance Forces (ISAF) and Resolute Support, Camp Julian, Kabul Military Training Center (KMTC), Kabul Afghanistan International Airport (KAIA) also known as Hamid Karzai International Airport (HKIA), Camp Morehead, Camp Policharki, Camp New Sarobi (Tora), National Military Hospital (NMH), New Kabul Compound (NKC), Camp Dubbs, Camp Bala Hissar, Camp Black Horse, Camp Green, Camp Integrity, Camp Qargha, Camp OQAB, U.S. Embassy, Camp Souter, Camp Scorpion, Camp Duskin, Camp Qasaba, Camp Dogan, and Camp Warehouse. 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 01 January 2017 through 31 December 2018 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 Kabul 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 January 2017 through 31 December 2018

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

SITE DESCRIPTION:

Kabul Headquarters: This compound is located within Kabul, which sits approximately 1791 meters in elevation, and is within the basin along the Hindu Kush mountain range. Low mountains surround the area, and the main source of drainage is via the Kabul River which flows through the basin. Hard concrete and paved roads are prominent, and very little industrial activity is present in close proximity to Kabul Headquarters.

KAIA or HKIA: This compound is located on the north side of the Kabul International Airport. It is on the north side of Kabul city and is an urban environment. Kabul city is surrounded by mountains, but the camp itself is very flat. The camp is directly adjacent to an active flight line. Other compounds (US State Department, Afghan Army, and others) flank HKIA within the greater airport compound. The compound is largely hard scaped, and all roads and most walkways are paved. Unpaved areas are almost all filled in with loose rocks to mitigate dust and mud. Most industrial operations on site operate

away from living facilities and restaurants or are of a reasonable distance. Living areas and offices are hard structured and provide better protection from noise and dust. Smog is very thick especially in the earlier parts of the day.

NKC: This compound is located in an urban area settled within Kabul City. NKC is located near Kabul's large industries and one of the city's busiest traffic circles. The site is mostly all flat, hard-scape, and hard-structured. The area around the camp is mostly all Afghan government facilities and local businesses, with some residential housing. The Asamayi and Sher Darwaza mountain ranges are to the South of NKC.

Other locations: Data was not available for the other locations listed above.

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 Kabul 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 Kabul and vicinity:

Food/waterborne diseases (e.g., bacterial diarrhea, hepatitis A, typhoid/paratyphoid fever, diarrhea-cholera, diarrhea-protozoal, brucellosis, hepatitis E); other endemic diseases (malaria, Crimean-Congo hemorrhagic fever, leishmaniasis-cutaneous (acute), sandfly fever, typhus-miteborne (scrub typhus), leptospirosis, Tuberculosis (TB), rabies, Q fever, and soil transmitted helminthes (hookworm, strongyloidiasis, cutaneous larva migrans)) 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 (malaria, Crimean-Congo hemorrhagic fever, leishmaniasis-cutaneous (acute), sandfly fever, typhus-miteborne (scrub typhus)), 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 June 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.

Air quality: For inhalable fine particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$) from environmental dust (including any burn pits and/or incinerators, which might have existed), the $PM_{2.5}$ overall short-term health risk was 'Low.' However, the Kabul and vicinity area is a dust-prone desert environment, with a semi-arid climate, also subject to vehicle traffic. Consequently, exposures to $PM_{2.5}$ 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. Burn pits and/or incinerators might have existed in the area (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 cannot be evaluated– see Section 10.7. 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 incinerator and/or 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 Kabul 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 Kabul and vicinity:

Air quality: For inhalable fine particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$) from environmental dust (including any burn pits and/or incinerators, which might have existed), the overall long-term health risk was 'Moderate.' However, the Kabul and vicinity area is a dust-prone desert environment with a

semi-arid climate, also subject to vehicle traffic, and conditions may have varied. Burn pits and/or incinerators might have existed in area (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 cannot be evaluated– see Section 10.7. Where burn pits exist, 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 incinerator and/or 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 - Kabul and vicinity[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 2.5 micrometers in diameter ($PM_{2.5}$)	Short-term: Low. 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 taking actions such as closing tent flaps, windows, and doors.	Short-term: Low. 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. 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/pre-existing respiratory diseases).		Long-term: Moderate. 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/pre-existing respiratory diseases).
ENDEMIC DISEASE			
Food borne/Waterborne (e.g., diarrhea-bacteriological)	Short-term: Variable; High (bacterial diarrhea, hepatitis A, typhoid/paratyphoid fever, diarrhea-protozoal) to Moderate (diarrhea-cholera, brucellosis, hepatitis E) to Low (polio) if ingesting local food/water, the health effects can temporarily incapacitate personnel (diarrhea) or result in prolonged illness (hepatitis A, Typhoid/paratyphoid fever, hepatitis E, brucellosis).	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; High for malaria and Crimean-Congo hemorrhagic fever, Moderate for leishmaniasis - cutaneous (acute), sandfly fever, typhus-miteborne (scrub typhus); and Low for, the plague and West Nile fever.	Preventive measures include proper wear of treated uniform, application of repellent to exposed skin, bed net use, minimizing areas of standing water.	Short-term: Low
	Long-term: Low for 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 for leptospirosis.
	Long-term: No data available		Long-term: No data available
Respiratory	Short-term: Variable; Moderate for tuberculosis (TB) to Low for meningococcal meningitis, and Middle East respiratory syndrome coronavirus	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 to Low for anthrax and avian influenza.	Prohibiting contact with, adoption, or feeding of feral animals in accordance with U.S. Central Command (CENTCOM) General Order (GO) 1C. Risks are further reduced in the	Short-term: No data available
	Long-term: Low (Rabies)		Long-term: No data available

Source of Identified Health Risk[3]	Unmitigated Health Risk Estimate[4]	Control Measures Implemented	Residual Health Risk Estimate[4]
		event of assessed contact by prompt post-exposure rabies prophylaxis in accordance with The Center for Disease Control's Advisory Committee on Immunization Practices guidance.	
Aerosolized Dust or Soil-contact	Short-term: Moderate for soil transmitted helminthes (hookworm, strongyloidiasis, cutaneous larva migrans).	Risk was reduced to Low by limiting exposure to soil contaminated with human or animal feces (including sleeping on bare ground, and walking barefoot).	Short-term: Low
	Long-term: No data available		Long-term: No data available
VENOMOUS ANIMALS			
Snakes, scorpions, and spiders	Short-term: 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).	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 (e.g., widow spider) to potentially lethal effects (e.g., Haly's Pit Viper).
	Long-term: No data available		Long-term: No data available
HEAT/COLD STRESS			
Heat	Short-term: Variable; Risk of heat injury is High for June-September, and Low to Moderate for all other months.	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 is Moderate for June-September and Low to Moderate for all others.
	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.		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.	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.		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	Short-term: No data available. Burn pits were not located at Kabul and vicinity during the January 2017 to December 2018 timeframe; however, where they did exist in the vicinity (for		Short-term: No data available

Source of Identified Health Risk[3]	Unmitigated Health Risk Estimate[4]	Control Measures Implemented	Residual Health Risk Estimate[4]
	example, burn pits used by the local population), the health risks cannot be evaluated See Section 10.7. Exposure to burn pit smoke is variable. Exposure 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, such as those with pre-existing health conditions (e.g., asthma, or cardiopulmonary disease, which may be exacerbated).		
	Long-term: No data available. Burn pits were not located at Kabul and vicinity during the January 2016 to December 2016 timeframe; however, where they did exist in the vicinity (for example, burn pits used by the local population), cannot be evaluated. See Section 10.7. Exposure to burn pit smoke is variable. Exposure to high levels of PM_{10} and $PM_{2.5}$ in the smoke may be associated with some otherwise healthy personnel, who were exposed for a long-term period, possibly developing 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.		Long-term: No data available

1 This Summary Table provides a qualitative estimate of population-based short- and long-term health risks associated with the occupational and environment health conditions at Kabul and vicinity. 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 January 2017 through 31 December 2018. 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 Kabul 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. 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.

4Health 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 Kabul and vicinity, Afghanistan 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 (USAPHC) 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 5). 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

Kabul and vicinity are 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, 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 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:

A total of 62 valid $PM_{2.5}$ air samples were collected from 20 January 2017 – 10 December 2018. The range of 24-hour $PM_{2.5}$ concentrations was 39 µg/m^3 – 410 µg/m^3 with an average concentration of 103 µg/m^3. The Standard Deviation was 104 µg/m^3 and the 95% Upper Confidence Limit of the mean was 129 µg/m^3.

2.3.3 Short-term health risks:

Low: The short-term $PM_{2.5}$ health risk assessment is Low based on the 95% UCL of the mean and peak $PM_{2.5}$ sample concentrations, and the likelihood of exposure at these hazard severity levels. A Low health risk is expected and little or no impact on accomplishing the mission (Reference 4, Table 3-2). Confidence in the short-term $PM_{2.5}$ health risk assessment was low (Reference 4, Table 3-6).

The hazard severity was Negligible (>65 µg/m^3) for the 95% UCL and Marginal (>250 µg/m^3) for the peak $PM_{2.5}$ sample concentrations. For exposures at the Negligible hazard severity level, a few personnel may experience notable eye, nose, and throat irritation; most personnel will experience only mild effects. (Reference 4, Table 3-10). For exposures at the Marginal hazard severity level, a majority of personnel will experience notable eye, nose and throat irritation and some respiratory effects (Reference 4, Table 3-10).

2.3.4 Long-term health risks:

Moderate: The long-term health risk assessment is Moderate based on the 95% UCL of the mean $PM_{2.5}$ 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 require limited future medical surveillance activities and resources (Reference 4, Table 3-3). Confidence in the long-term $PM_{2.5}$ health risk assessment is moderate (Reference 4, Table 3-6).

The hazard severity was marginal (>65 µg/m^3) for the 95% UCL of the average $PM_{2.5}$ sample concentrations. For repeated exposures above the marginal hazard severity level 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. This guideline is an uncertain screening value - it is not a known health effects concentration. (Reference 4, Table 3-11).

2.4 Airborne Metals

2.4.1 Airborne Metals from $PM_{2.5}$

2.4.1.1 Exposure Guidelines

Short Term Cadmium MEGs (µg/m^3):

- 1-hour Negligible MEG= 100
- 1-hour Marginal MEG= 760
- 14-day negligible Meg= 0.0205

Long Term Acrolein MEG (µg/m^3):

- 1-year Negligible MEG= 0.00685

2.4.1.2 Sample data/Notes:

A total of 62 valid $PM_{2.5}$ airborne metal samples were collected from 20 January 2017 – 10 December 2018. Cadmium was detected above both the short and long-term MEGs in two of the samples. Health effects of cadmium include lung damage at high enough levels and kidney damage after long-term exposure (Reference 12)

2.4.1.3 Short-term and long-term health risks:

Insufficient data available to assess short and long-term risk

2.5 Volatile Organic Compounds

2.5.1 Exposure Guidelines

Short Term Acrolein MEGs (µg/m^3):
- 8-hour Negligible MEG=70.0
- 14-day Negligible MEG=46.0

Long Term Acrolein MEG (µg/m^3):
- 1-year Negligible MEG=0.14

2.5.2 Sample data/Notes:

KAIA: A sample was collected at the Flight line/BLDG 100 0n 28 August 2017. The detected acrolein concentration (1.2 µg/m^3) exceeded the 1-year Negligible MEG (0.14 µg/m^3). Health effects from long-term exposures to acrolein are currently not known (Reference 11).

Kabul Headquarters: A sample was collected near the DFAC generators on 21 September 2017. No detected concentration were above the MEGs.

2.5.3 Short-term health risks:

None identified based on available sampling data

2.5.4 Long-term health risk

Insufficient data available to assess chronic risk

3 Soil

3.1 Site-Specific Sources Identified

3.2 Sample data/Notes:

No soil samples were collected at any of the locations in 2017-2018.

3.3 Short-term health risk:

Not an identified source of health risk. Currently, sampling data for soil are not evaluated for short term (acute) health risks.

3.4 Long-term health risk:

No data available to assess chronic risk

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. It is assumed that 100% of all U.S. personnel at Kabul and vicinity were directly exposed to reverse osmosis water purification unit (ROWPU) treated, disinfected fresh bulk water, bottled water, and untreated well water since this classification of water is primarily used for personal hygiene, showering, cooking, and for use at vehicle wash racks. There is a possibility that personnel, particularly at small outlying camps, may use water that is not regularly disinfected for showering, personal hygiene, or cleaning.

4.1 Drinking Water: Bottled or Treated

4.1.1 Site-Specific Sources Identified

Drinking water is from the water bottling plant in Kabul City (US Army VETCOM approved source). Cristal® and Aquafina® are the primary brands of bottled water on KAIA.

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 5 liters per day (L/day) of bottled water for up to 365 days (1-year). It was further assumed that control measures were not used. No valid drinking water samples were collected in 2017-2018 from any of the locations.

4.1.3 Short-term and long-term health risk:

No data available to assess short and long-term health risk from drinking water

4.2 Non-Drinking Water: Disinfected Fresh/Treated

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.

Duskin: A single non-drinking ROWPU treated sample was collected in March 2018. An insufficient number of non-drinking water samples were available to assess risk at this location. However, it should be noted that no chemical concentrations exceeded the short and long term MEGs.

Kabul Headquarters: Two non-drinking ROWPU treated samples were collected in August 2017. Samples of untreated well water were taken in July and August of 2017. An insufficient number of non-drinking water samples were available to assess risk at this location. However, it should be noted that no chemical concentrations exceeded the short or long term MEGs.

KAIA: Samples of disinfected treated freshwater were collected in January and July of 2017. Samples of untreated well water were taken in January 2017 and April 2018. An insufficient number of non-drinking water samples were available to assess risk at this location. However, it should be noted that sulfate exceeded the short-term MEG in one of the untreated samples. Boron exceeded both the short-term and long-term MEG in one of the untreated samples and the short-term MEG in one of the treated samples.

Morehead: Single samples of ROWPU treated water were taken in September of 2017 and July of 2018. Single untreated well water samples were taken in November of 2017 and March and August of 2018. An insufficient number of non-drinking water samples were available to assess risk at this location. However, it should be noted that sulfate exceeded the short-term MEG in one of the untreated samples.

NKC: Samples of ROWPU treated water were taken in January of 2017 and March and April of 2018. Two samples of untreated well water were taken in April of 2018. An insufficient number of non-drinking water samples were available to assess risk at this location. However, it should be noted that no chemical concentrations exceeded the short or long term MEGs.

OQAB: A single non-drinking disinfected treated freshwater sample was collected in September 2017. An insufficient number of non-drinking water samples were available to assess risk at this location. However, it should be noted that no chemical concentrations exceeded the short or long term MEGs.

Scorpion: Samples of untreated well water were taken in August and October of 2017 and January of 2018. An insufficient number of non-drinking water samples were available to assess risk at this location. However, it should be noted that no chemical concentrations exceeded the short or long term MEGs.

4.2.3 Short-term and long-term health risks:

Insufficient data available to assess short and long-term health risk.

5 Military Unique

5.1 Chemical Biological, Radiological Nuclear Weapons

No specific hazard sources were documented in the Defense Occupational and Environmental Health Readiness System (DOEHRS) from 1 January 2017 to 31 December 2018 (Reference 1).

5.2 Depleted Uranium

No specific hazard sources were documented in DOEHRS from 01 January 2017 through 31 December 2018 (Reference 1).

5.3 Ionizing Radiation

No specific hazard sources were documented in DOEHRS from 01 January 2017 through 31 December 2018 (Reference 1).

5.4 Non-Ionizing Radiation

No specific hazard sources were documented in DOEHRS from 01 January 2017 through 31 December 2018 (Reference 1).

6 Endemic Diseases

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 6) 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 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* spp.) 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)

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. Mitigation strategies in place include consumption of approved food, water, and ice; hand washing; and applied food/water safety mechanisms. Field conditions (including lack of hand washing and primitive sanitation) may facilitate person-to-person spread and epidemics. Typically diarrheal diseases are a mild disease treated in an outpatient setting with 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, typhoid/paratyphoid fever, and diarrhea-protozoal

Unmitigated health risk to U.S. personnel is high year round for hepatitis A and typhoid/paratyphoid fever, and diarrhea-protozoal. Mitigation strategies in place include immunization, consumption of approved food, water, and ice; hand washing; and applied food/water safety mechanisms. U.S. Personnel did not drink untreated water, and vaccination for Hepatitis A is required for deployment into the CENTCOM Area or Responsibility (AOR). 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 Polio

Potential 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% develops 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.

6.2 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

Potential unmitigated risk to U.S. personnel is High during warmer months (typically April through November) but reduced to low with mitigation measures. 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. Mitigation strategies in place include Individual Protective Measure practices, taking Malaria chemoprophylaxis, permethrin treated uniforms, pesticides, reduction of pest/breading habitats, and engineering controls.

6.2.2 Leishmaniasis

The disease risk is Moderate during the warmer months when sandflies are most prevalent, but reduced to low with mitigation measures. Mitigation strategies in place include Individual Protective Measures (IPM) practices, permethrin treated uniforms, pesticides, reduction of pest/breeding habitats, and engineering controls. Leishmaniasis is transmitted by sand flies. 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.

6.2.3 Crimean-Congo hemorrhagic fever

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

Sandfly fever has a Moderate risk with potential disease rates from 1% to 10% per month; under worst case conditions disease rates can be as high as 50%. 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 results in debilitating febrile illness requiring 1 to 7 days of supportive care followed by return to duty.

6.2.5 Plague

Potential 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.

6.2.6 Typhus-miteborne (scrub typhus)

Potential health risk to U.S. personnel is Moderate during warmer months (typically March through November) when vector activity is highest. Mitigation measures reduced the risk to low. Mite-borne 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.

6.2.7 West Nile fever

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 were asymptomatic although fever, headache, tiredness, body aches (occasionally with a skin rash on trunk of body), and swollen lymph glands can occurred. This disease is associated with a low risk estimate.

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

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 *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. Incidence could result in debilitating febrile illness typically requiring 1 to 7 days of inpatient care, followed by return to duty; some cases may require prolonged convalescence. Mitigation strategies in place include avoiding water contact and recreational water activities; proper wear of uniform, especially footwear, and protective coverings for cuts/abraded skin. This disease is associated with a Moderate health risk estimate.

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, measles, 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 when necessary for healthcare providers and detention facility personnel.

6.4.1 Tuberculosis (TB)

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. Individuals with prolonged indoor exposure to the local population are at increased risk for latent TB infection.

6.4.2 Meningococcal meningitis

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 Middle East respiratory syndrome coronavirus (MERS-CoV)

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.

6.5 Animal-Contact Diseases

6.5.1 Rabies

Rabies posed a year-round moderate risk. Occurrence in local animals was well above U.S. levels due to the lack of organized control programs. Dogs are 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 13). Laboratory results indicated the Soldier was infected from contact with a dog while deployed. Although 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.

6.5.2 Anthrax

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 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

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 Avian influenza

Potential health risk to U.S. personnel is Low. 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.

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

Potential health risk to U.S. personnel is Moderate during warmer months (typically March through November) when vector activity is highest. Mitigation measures reduced the risk to low. 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, 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* spp. 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.

7 Venomous Animals

All information was taken directly from the Armed Forces Pest Management Board (Reference 7) and the Clinical Toxinology Resources web site from the University of Adelaide, Australia (Reference 8). The species listed below have home ranges that overlap the location of Kabul 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 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

- *Mesobuthus caucasicus, Mesobuthus eupeus, Mesobuthus macmahoni, Orthochirus afghanus, Orthochirus. Jalalabadensis, Orthochirus pallidus, Orthochirus samrchelsis*: 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*: 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

- *Gloydius halys* (Haly's pit viper): Severe envenoming possible, potentially lethal. Bites may cause moderate to severe coagulopathy and haemorrhagins causing extensive bleeding.

- *Hemorrhis ravergieri* (mountain racer): Unlikely to cause significant envenoming. Bites require symptomatic treatment only.

- *Macrovipera lebetina obtusa* (Lebetine viper), *and Macrovipera lebetina turanica* (*Turan blunt-nosed viper*): Severe envenoming possible, potentially lethal. Bites may cause mild to severe local effects, shock & coagulopathy.

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

- *Platyceps rhodorachis* (Jan's desert racer): Mild envenoming only, not likely to prove lethal. Requires symptomatic treatment only.

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

8.1 Heat

Precipitation is concentrated in the winter (snow) and spring months. Summers are long and hot (temperatures range from 58 degrees Fahrenheit (°F) to 90 °F) but have very low humidity. Fall (October and November) is warm and dry. Winters are cold but short, lasting from December to March (temperature range: 19 °F to 40 °F). Spring in Kabul starts in late March and is the wettest time of the year (average rainfall for March is 3 inches). Work intensity and clothing/equipment worn pose greater health risk of heat stress/injury than environmental factors alone (Reference 9). 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, and monitoring Wet Bulb Globe Temperature (WBGT). 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) is High from June - September, Moderate from April – May and October – November, and Low from December – March. Confidence in the health risk

estimate is low (Reference 4, 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 4, Table 3-6).

8.2 Cold

8.2.1 Short-term health risks:

Winter (December - March) mean daily minimum temperatures range from 19 °F to 40 °F. 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 from December – 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 (Reference 10).

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

8.2.2 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 hazard sources were documented in DOEHRS from 01 January 2017 through 31 December 2018 (Reference 1).

9.1.1 Short and long-term health risks:

Not evaluated

9.2 Impulse

No specific hazard sources were documented in the DOEHRS or MESL from 01 January 2017 through 31 December 2018 (Reference 1).

9.2.1 Short 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

ECOLOG is contracted to pick up and dispose of all hazardous and medical waste on Kabul Headquarters and Kabul International Airport. Contractors remove waste, which is then trucked to KAIA for burning in the incinerators. A smaller incinerator is located on the south side of the KAIA hospital and is used only for the disposal of Regulated Medical Waste generated by the hospital.

10.3 Fuel/petroleum products/industrial chemical spills

Kabul Headquarters: Five 20,000 liter containers of diesel fuel are located at the motorpool and fuel point. Past spills have occurred during refilling of tanks but the spills were contained in a secondary containment site and firefighters cleaned the spill and disposed of the waste.

KAIA: Two 25,000 containers of JP-8 fuel are located on the southeast corner of the camp. The fuel yard is designed to capture any spills and contain them.

NKC: Five to six 55 gallon drums of JP-8 fuel are located next to the solid waste consolidation point. No past releases have occurred and mitigation measures limiting exposure to hazardous materials are in place.

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 against these pests generally involved selection of compounds with low mammalian toxicity and short-term residual using pinpoint rather than broadcast application techniques.

Kabul Headquarters: FLUOR (contractor) conducts all pest surveillance as well as treatment. Cats are found throughout the compound, and are treated and vaccinated. Flies and mosquitos are present in the areas around the compound, but not found in significant amounts in the area.

KAIA: KBR contract does pest control on HKIA, and conducts monthly spraying of dumpsters and building exteriors.

NKC: FLUOR visits the basecamp monthly, and cats are the biggest pest concern for NKC. Trash cans need to have lids and remain closed when not in use. Based on preventative medicine assessments, all of the facilities provided pest exclusion but the cats have plenty of harborage.

10.5 Asbestos

No specific hazard sources were documented in DOEHRS from 01 January 2017 through 31 December 2018 (Reference 1).

10.6 Lead Based Paint

No specific hazard sources were documented in DOEHRS from 01 January 2017 through 31 December 2018 (Reference 1).

10.7 Burn Pit

Burn pits were not located on base at Kabul and vicinity during the January 2017 to December 2018 timeframe. However, there may have been burn pits off base (for example, burn pits used by the local population). An incinerator was located at KAIA, but no air samples were identified as being collected near the incinerator. While not specific to Kabul 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 10). The Institute of Medicine committee's (Reference 10) review of long-term health consequences of exposure to burn pits in Iraq and Afghanistan 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 or near 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 U.S. 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

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4. USAPHC Technical Guide 230, June 2013 Revision.

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

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12. ATSDR. 2012. Toxicological Profile for Cadmium. https://www.atsdr.cdc.gov/toxprofiles/tp5.pdf. April 2019.

13. CDC. 2012. Morbidity and Mortality Weekly Report. Imported Human Rabies in a U.S. Army Soldier. May 4, 2012. 61(17); 302-305.

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) Phone: (757) 953-0700. http://www.med.navy.mil/sites/nmcphc/Pages/Home.aspx
U.S. Air Force School of Aerospace Medicine (USAFSAM) Phone: (888) 232-3764. http://www.wpafb.af.mil/afrl/711hpw/usafsam.asp
DoD Health Readiness Policy and Oversight (HRP&O) Phone: (800) 497-6261. http://fhpr.dhhq.health.mil/home.aspx