

**Military Deployment**  
**Periodic Occupational and Environmental Monitoring Summary (POEMS):**  
**Camp Spann and vicinity, Afghanistan**  
**Calendar Years: (2011 to 2013)**

**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, See *REFERENCES*.

**PURPOSE:** This POEMS documents the Department of Defense (DoD) assessment of Occupational and Environmental Health (OEH) risk for Camp Spann and vicinity that includes Camp Marmal, Camp Meymaneh, Camp Jordania, Forward Operating Base (FOB) Hairatan, and Mazar-e-Sharif. It presents a qualitative summary of health risks identified at this location and their potential medical implications. The report is based on information collected from 09 October 2011 through 30 June 2013 to include deployment OEHS 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 Spann 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 09 October 2011 through 30 June 2013.

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

**SITE DESCRIPTION:**

Camp Spann, Camp Marmal, Camp Meymaneh, Camp Jordania, and FOB Hairatan were located in northern Afghanistan in the Balkh province. Camp Spann was located inside the northwestern corner of an Afghanistan National Army (ANA) Training Base (Camp Shaheen) on the southwestern edge of the city of Mazar-e Sharif. There was a concrete batch plant adjacent to the western wall. Camp Jordania was located near Camp Spann. Mazar-e Sharif was the fourth largest city of Afghanistan, with a population of about 375,000 as of 2006. The city was a major tourist attraction because of its famous shrines as well as the Muslim and Hellenistic archeological sites. The surrounding plains (north, east, and west) of Mazar-e Sharif were used for agriculture and grazing with the Hindu Kush Mountain range (2000 m high) to the south. Camp Marmal was located south of Mazar-e Sharif, at the foot of the Hindu Kush Mountains. Camp Marmal began expansion/construction in 2010 and was collocated with the German Camp Marmal. The German camp was well developed, complete with water treatment and wastewater treatment systems. The German area of the camp had many hardened buildings and billeting areas and was bordered on three sides by cement walls that were constructed in-part to prevent the entry of sandflies and rodents. FOB Hairatan was located approximately 60 km north of Mazar-e Sharif close to the city of Termez, on the Amu Darya River. The river formed the border with Uzbekistan, and the two nations were connected by the Afghanistan-Uzbekistan Friendship Bridge. Camp Meymaneh was located in northern Afghanistan in the Faryab province north of the city of Meymaneh and approximately 250 km west southwest of Mazar-e Sharif. The city of Meymaneh was located at the northern foot of the Torkestan Range at an elevation of 877 meters on the old terrace of

the Qeysar or Meymaneh River. The highlands of the Meymaneh region generally possessed very rich topsoil, which supports seasonal agricultural activities.

**SUMMARY:** Conditions that may have posed a Moderate or greater health risk are summarized in Table 1. Table 2 provides population based risk estimates for identified OEH conditions at Camp Spann 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 may have caused acute health effects in some personnel during deployment at Camp Spann and vicinity that includes Camp Marmal, Camp Meymaneh, Camp Jordania, FOB Hairatan, and Mazar-e-Sharif:

Inhalable fine particulate matter less than 2.5 micrometers in diameter (PM<sub>2.5</sub>); food/waterborne diseases (e.g., bacterial diarrhea, hepatitis A, typhoid fever, brucellosis, diarrhea-cholera, diarrhea-protozoal, hepatitis E); other endemic diseases (malaria, cutaneous leishmaniasis, Crimean-Congo hemorrhagic fever, sandfly fever, typhus-miteborne, leptospirosis, Tuberculosis (TB), rabies, anthrax, Q fever); and heat stress. For food/waterborne diseases (e.g., bacterial diarrhea, hepatitis A, typhoid fever, brucellosis, diarrhea-cholera, diarrhea-protozoal, hepatitis E), if ingesting local food and water, the health effects can temporarily incapacitate personnel (diarrhea) or result in prolonged illness (hepatitis A, typhoid 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, Crimean-Congo hemorrhagic fever, sandfly fever, typhus-miteborne), these diseases may constitute a significant risk due to exposure to biting vectors; risk reduced to low by proper wear of the treated uniform, application of repellent to exposed skin, use of bed net, minimizing areas of standing water, and appropriate chemoprophylaxis. For water contact diseases (leptospirosis) activities involving extensive contact with surface water increase risk. For respiratory diseases (Tuberculosis (TB)), personnel in close-quarter conditions could have been at risk for person-to-person spread. Animal contact diseases (rabies, anthrax, Q fever), pose year-round risk. For heat stress, risk can be greater during months of May through September and greater for susceptible persons including those older than 45, of low fitness level, unacclimatized, or with underlying medical conditions. Risks from heat stress may have been reduced with preventive medicine controls, work-rest cycles, proper hydration and nutrition, and mitigation.

Air quality: For PM<sub>2.5</sub> and inhalable coarse particulate matter less than 10 micrometers in diameter (PM<sub>10</sub>), (although the PM<sub>10</sub> overall short-term risk was not evaluated due to insufficient data), exposures 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. For PM<sub>10</sub> and PM<sub>2.5</sub>, 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. Although most effects from exposure to particulate matter should have resolved post-deployment, providers should be prepared to consider the relationship between deployment exposures and current complaints. Some individuals may have sought treatment for acute respiratory irritation during their time at Camp Spann and vicinity, which includes Camp Marmal, Camp Jordania, Camp Meymaneh, FOB Hairatan and Mazar-e-Sharif. Personnel who reported with symptoms or required treatment while at this site should have exposure/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 hazards associated with potential long-term health effects at Camp Spann and vicinity that includes Camp Marmal, Camp Meymaneh, Camp Jordania, FOB Hairatan, and Mazar-e-Sharif include inhalable fine particulate matter less than 2.5 micrometers in diameter (PM<sub>2.5</sub>).

Air Quality: For inhalational exposure to high levels of dust and particulate matter, including PM<sub>2.5</sub> and PM<sub>10</sub>, (although fine particulate matter less than 10 micrometers in diameter (PM<sub>10</sub>) was not evaluated for long-term risk due to no available health guidelines), such as during high winds or dust storms, it is considered possible that some otherwise healthy personnel who were exposed for a long-term period to dust and particulate matter (PM) 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 PM exposures are documented and archived, at this time there are 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 occupational or specific personal dosimeter data) and individual behaviors 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 Spann and vicinity that includes Camp Marmal, Camp Meymaneh, Camp Jordania, FOB Hairatan, and Mazar-e-Sharif:<sup>1, 2</sup>**

Source of Identified Health Risk <sup>3</sup>	Unmitigated Health Risk Estimate <sup>4</sup>	Control Measures Implemented	Residual Health Risk Estimate <sup>4</sup>
<b>AIR</b>			
PM <sub>10</sub>	Short-term: There were insufficient data with which to characterize short-term health risk from exposure to PM <sub>10</sub> . Daily levels varied, acute health effects (e.g., upper respiratory tract irritation) more pronounced during peak days. More serious effects were possible in susceptible persons (e.g., those with asthma/existing respiratory diseases).	Limiting strenuous physical activities when air quality is especially poor; and actions such as closing tent flaps, windows, and doors.	Short-term: There were insufficient data with which to characterize short-term health risk from exposure to PM <sub>10</sub> . Daily levels varied, acute health effects (e.g., upper respiratory tract irritation) more pronounced during peak days. More serious effects were possible in susceptible persons (e.g., those with asthma/existing respiratory diseases).
	Long-term: No health guidelines		Long-term: No health guidelines
PM <sub>2.5</sub>	Short-term: None to Moderate, Daily levels varied, acute health effects (e.g., upper respiratory tract irritation) more pronounced during peak days. More serious effects were possible in susceptible persons (e.g., those with asthma/existing respiratory diseases).	Limiting strenuous physical activities when air quality was especially poor; and actions such as closing tent flaps, windows, and doors.	Short-term: None to Moderate, Daily levels varied, acute health effects (e.g., upper respiratory tract irritation) more pronounced during peak days. More serious effects were possible in susceptible persons (e.g., those with asthma/existing respiratory diseases).
	Long-term: Low to Moderate. A small percentage of personnel may have been at increased risk for developing chronic conditions. Particularly those more susceptible to acute effects (e.g., those with asthma/existing respiratory diseases).		Long-term: Low to Moderate. A small percentage of personnel may have been at increased risk for developing chronic conditions. Particularly those more susceptible to acute effects (e.g., those with asthma/existing respiratory diseases).
<b>Water</b>			
Water for Other Purposes	Short-term: Low for Sulfate.	Water treated in accordance with standards applicable to its intended use	Short-term: Low for Sulfate.
	Long-term: None.		Long-term: None.
<b>ENDEMIC DISEASE</b>			
Food borne/Waterborne (e.g., diarrhea-bacteriological)	Short-term: Variable; High (bacterial diarrhea, hepatitis A, typhoid fever) to Moderate (diarrhea-cholera, diarrhea- protozoal, brucellosis, hepatitis E) to Low (polio) if ingesting local food/water, the health effects could have temporarily incapacitated personnel (diarrhea) or result in prolonged illness (hepatitis A, Typhoid fever, hepatitis E, brucellosis).	Preventive measures included 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, Moderate for leishmaniasis - cutaneous (acute), Crimean-Congo hemorrhagic fever, sandfly fever,	Preventive measures included proper wear of treated uniform, application of repellent to	Short-term: Low

Camp Spann and vicinity, Afghanistan: 2011 to 2013

Source of Identified Health Risk <sup>3</sup>	Unmitigated Health Risk Estimate <sup>4</sup>	Control Measures Implemented	Residual Health Risk Estimate <sup>4</sup>
	typhus-miteborne; and Low for, the plague and West Nile fever.	exposed skin, bed net use, minimizing areas of standing water and appropriate chemoprophylaxis.	
	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.	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, anthrax, Q-fever to Low for H5N1 avian influenza.	Prohibiting contact with, adoption, or feeding of feral animals IAW U.S. Central Command (CENTCOM) General Order (GO) 1B. Risks were further reduced in the event of assessed contact by prompt post-exposure rabies prophylaxis IAW The Center for Disease Control's (CDC) Advisory Committee on Immunization Practices guidance.	Short-term: No data available
	Long-term: Low (Rabies)		Long-term: No data available
<b>VENOMOUS ANIMAL/ INSECTS</b>			
Snakes, scorpions, and spiders	Short-term: Low; If encountered, effects of venom varied with species from mild localized swelling (e.g. <i>Scorpiops lindbergi</i> ) to potentially lethal effects (e.g. <i>Gloydus halys</i> ).	Risk reduced by avoiding contact, proper wear of uniform (especially footwear), and proper and timely treatment.	Short-term: Low; If encountered, effects of venom varied with species from mild localized swelling (e.g. <i>Scorpiops lindbergi</i> ) to potentially lethal effects (e.g. <i>Gloydus halys</i> ).
	Long-term: No data available		Long-term: No data available
<b>HEAT/COLD STRESS</b>			
Heat	Short-term: Variable; Risk of heat injury was Extremely High for May-September, and Low 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 was Extremely High for May-September, and Low for all other months.
	Long-term: Low, The long-term risk was Low. However, the risk may have been 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 was Low. However, the risk may have been 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	Short-term: Low risk of cold stress/injury.
	Long-term: Low; Long-term health implications from cold injuries were rare but could have occurred, especially from more serious injuries such as frost bite.		Long-term: Low; Long-term health implications from cold injuries were rare but could have occurred, especially from more serious injuries such as frost bite.

Camp Spann and vicinity, Afghanistan: 2011 to 2013

Source of Identified Health Risk <sup>3</sup>	Unmitigated Health Risk Estimate <sup>4</sup>	Control Measures Implemented	Residual Health Risk Estimate <sup>4</sup>
		wear of issued protective clothing.	

<sup>1</sup>This Summary Table provides a qualitative estimate of population-based short- and long-term health risks associated with the occupational environment conditions at Camp Spann and vicinity that includes Camp Marmal, Camp Meymaneh, Camp Jordania, FOB Hairatan, and Mazar-e-Sharif. 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.

<sup>2</sup> This assessment is based on specific environmental sampling data and reports obtained from 9 October 2011 through 30 June 2013. 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.

<sup>3</sup>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 Spann 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 Army Public Health Center (Provisional). 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.

<sup>4</sup>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 Spann 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 US Army Public Health Command (USAPHC) Technical Guide 230, *Environmental Health Risk Assessment and Chemical Exposure Guidelines for Deployed Military Personnel* (USAPHC TG 230, Reference 10). All OEH risk estimates represent residual risk after accounting for preventive controls in place. Occupational exposures and exposures to endemic diseases are greatly reduced by preventive measures. For environmental exposures related to airborne dust, there are limited preventive measures available, and available measures have little efficacy in reducing exposure to ambient conditions.

## 2 Air

### 2.1 Site-Specific Sources Identified

Camp Spann and vicinity were 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 have resulted 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) were 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 could have included sand, soil, metals, volatile organic compounds (VOC), allergens, and other compounds such as nitrates or sulfates that are formed by condensation or transformation of combustion exhaust. The PM composition and particle size varied considerably depending on the source. Generally, PM of health concern is divided into two fractions: PM<sub>10</sub>, which includes coarse particles with a diameter of 10 micrometers or less, and fine particles less than 2.5 microns (PM<sub>2.5</sub>), 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 10 micrometers (PM<sub>10</sub>)

#### 2.3.1 Exposure Guidelines:

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

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

Long-term PM<sub>10</sub> MEG ( $\mu\text{g}/\text{m}^3$ ):

- Not defined and not available.

#### 2.3.2 Sample data/Notes:

A total of 5 valid PM<sub>10</sub> air samples were collected from 9 October 2011 – 30 June 2013. The range of 24-hour PM<sub>10</sub> concentrations was 110  $\mu\text{g}/\text{m}^3$  – 285  $\mu\text{g}/\text{m}^3$  with an average concentration of 176  $\mu\text{g}/\text{m}^3$ .

Camp Jordania: A total of 1 valid PM<sub>10</sub> air sample was collected on 10 April 2013. The 24-hour PM<sub>10</sub> concentration was 176  $\mu\text{g}/\text{m}^3$ .

Camp Marmal: A total of 4 valid PM<sub>10</sub> air samples were collected from 9 October 2011 to 28 November 2011. The range of 24-hour PM<sub>10</sub> concentrations was 110 µg/m<sup>3</sup> – 285 µg/m<sup>3</sup> with an average concentration of 177 µg/m<sup>3</sup>.

### 2.3.3 Short-term health risks:

**There were insufficient data with which to characterize short-term health risk from exposure to PM<sub>10</sub>.**

### 2.3.4 Long-term health risk:

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

## 2.4 Particulate Matter, less than 2.5 micrometers (PM<sub>2.5</sub>)

### 2.4.1 Exposure Guidelines:

#### Short Term (24-hour) PM<sub>2.5</sub> (µg/m<sup>3</sup>):

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

#### Long-term (1 year) PM<sub>2.5</sub> MEGs (µg/m<sup>3</sup>):

- Negligible MEG = 15
- Marginal MEG = 65.

### 2.4.2 Sample data/Notes:

Camp Jordania: A total of 1 valid PM<sub>2.5</sub> air sample was collected on 4 September 2012. The 24-hour PM<sub>2.5</sub> concentration was 107 µg/m<sup>3</sup>

Camp Marmal: A total of 28 valid PM<sub>2.5</sub> air samples were collected from 28 November 2011 to 4 May 2013. The range of 24-hour PM<sub>2.5</sub> concentrations was 15 µg/m<sup>3</sup> – 334 µg/m<sup>3</sup> with an average concentration of 67 µg/m<sup>3</sup>.

### 2.4.3 Short-term health risks:

**None to Moderate:** The short-term PM<sub>2.5</sub> health risk assessment was None to Moderate based on average and peak PM<sub>2.5</sub> sample concentrations, and the likelihood of exposure at these hazard severity levels. A Moderate health risk assessment was expected to have degraded mission capabilities in terms of the required mission standard and will result in reduced mission capability if hazards occur during the mission. Limited in-theater medical countermeasures and resources anticipated (TG 230 Table 3-2). Daily average health risk levels for PM<sub>2.5</sub> showed no hazard for 76.2%, low health risk for 19%, and moderate health risk for 4.8% of the time. Confidence in the short-term PM<sub>2.5</sub> health risk assessment was low (Reference 10, Table 3-6).

The hazard severity for average PM<sub>2.5</sub> concentrations in samples was negligible. The results indicated that a few personnel may experience notable mild eye, nose, or throat irritation; most personnel will experience only mild effects. Pre-existing health conditions (e.g., asthma, or cardiopulmonary diseases) may have been exacerbated. (Reference 10, Table 3-10).

For the highest observed PM<sub>2.5</sub> exposure, the hazard severity was marginal. During peak exposures at the marginal hazard severity level, a majority of personnel will have experienced notable eye, nose, and

throat irritation and some respiratory effects. Some lost-duty days were expected. Significant aerobic activity will have increased risk. Those with a history of asthma or cardiopulmonary disease were expected to experience increased symptoms (Reference 10, Table 3-10).

#### 2.4.4 Long-term health risks:

**Low to Moderate:** The long-term health risk assessment was Low to Moderate based on average PM<sub>2.5</sub> concentration, and the likelihood of exposure at this hazard severity level. A Low health risk level suggested that long-term exposure to PM<sub>2.5</sub> was expected to require no specific medical action and a Moderate health risk level suggested that long-term exposure to PM<sub>2.5</sub> was expected to require limited future medical surveillance activities and related resources (Reference 10, Table 3-3). Confidence in the long-term PM<sub>2.5</sub> health risk assessment was low (Reference 10, Table 3-6).

The hazard severity was negligible to marginal for average PM<sub>2.5</sub> sample concentrations. The results suggested that with repeated exposures above the negligible hazard severity threshold, it was considered possible that a small percentage of personnel may have increased risk for developing chronic conditions, such as reduced lung function or exacerbated chronic bronchitis, chronic obstructive pulmonary disease, asthma, atherosclerosis, or other cardiopulmonary diseases. Personnel with history of asthma or cardiopulmonary disease were considered to be at particular risk. Exposures below this were not expected to result in development of chronic health conditions in generally healthy troops. With repeated exposures above the marginal hazard severity threshold, it was plausible that development of chronic health conditions such as reduced lung function or exacerbated chronic bronchitis, chronic obstructive pulmonary disease, asthma, atherosclerosis, or other cardiopulmonary diseases could occur in generally healthy troops. Those with a history of asthma or cardiopulmonary disease were considered to be at particular risk (Reference 10, Table 3-11).

## 2.5 Airborne Metals

### 2.5.1 Sample data/Notes:

A total of 5 valid PM<sub>10</sub> airborne metal samples were collected at Camp Spann (and vicinity) from 9 October 2011 to 28 November 2011. A total of 29 valid PM<sub>2.5</sub> airborne metal samples were collected at Camp Spann (and vicinity) from 28 November 2011 to 4 May 2013. None of the analyzed metals were found at concentrations above short or long-term MEGs.

### 2.5.2 Short-term and Long-term health risks:

**None identified based on the available sampling data.**

## 3 Soil

### 3.1 Site-Specific Sources Identified

### 3.2 Sample data/Notes:

A total of 5 valid surface soil samples were collected from 9 April 2013 to 25 April 2013, to assess OEH health risk to deployed personnel. The primary soil contamination exposure pathways were 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). The percent of the population exposed to soil and associated dust in the sampled areas was > 75% for 5



samples. For the risk assessment, personnel were assumed to remain at this location for 6 months to 1 year.

### 3.3 Short-term health risk:

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

### 3.4 Long-term health risk:

**None identified based on available sample data.** No parameters exceeded 1-year Negligible MEGs.

## 4 Water

In order to assess the health risk to U.S. personnel from exposure to water in theater, the USAPHC identified the most probable exposure pathways. These were based on the administrative information provided on the field data sheets submitted with the samples taken over the time period being evaluated. It was assumed that 100% of all U.S. personnel at Camp Spann (and vicinity) will be directly exposed to Reverse Osmosis Water Purification Unit (ROWPU) treated, disinfected fresh bulk water, and untreated well water since this classification of water was primarily used for personal hygiene, showering, cooking, dust abatement, and for use at vehicle wash racks. No drinking water samples were available for analysis.

### 4.1 Non-Drinking Water: ROWPU and Disinfected Fresh Water

#### 4.2.1 Site-Specific Sources Identified

Although the primary route of exposure for most microorganisms was ingestion of contaminated water, dermal exposure to some microorganisms, chemicals, and biologicals may also cause adverse health effects. Complete exposure pathways would have included 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 5 liters per day (L/day) of non-drinking water for up to 365 days (1-year). It was further assumed that control measures and/or personal protective equipment were not used. A total of 16 non-drinking samples from 23 April 2012 to 28 June 2013 were evaluated for this health risk assessment. No chemicals were detected at levels above the long-term MEGs.

#### 4.2.3 Short-term health risks:

**Low:** Sulfate had a peak (1300 mg/L) concentration in 2012 and had a peak (1200 mg/L) concentration in 2013 that exceeded the short-term 5 L/d14 day negligible MEG (750 mg/L). The average concentrations of sulfate in those years (357 mg/L in 2012 and 205 mg/L in 2013) were below the short-term 5 L/d14 day negligible MEG (750 mg/L). The short-term health risk assessment for non-drinking sulfate concentrations was Low based on average and peak sulfate concentrations. Therefore, on typical and peak days non-drinking exposure to sulfate was likely to have little or no impact on

accomplishing the mission and little to no in-theater medical resources anticipated for protection and treatment.

The hazard severity was negligible for average and peak non-drinking sulfate exposures. During typical and peak exposures at the negligible hazard severity level, few exposed personnel (if any) were expected to have noticeable health effects during mission. Confidence in the health risk assessment was low (Reference 10, Table 3-6).

#### 4.2.3 Long-term health risks:

**None identified based on available sample data.** All collected samples were below the 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 the 09 October 2011 through 30 June 2013 timeframe.

### 5.2 Depleted Uranium (DU)

No specific hazard sources were documented in the DOEHRS or MESL from the 09 October 2011 through 30 June 2013 timeframe.

### 5.3 Ionizing Radiation

No specific hazard sources were documented in the DOEHRS or MESL from the 09 October 2011 through 30 June 2013 timeframe.

### 5.4 Non-Ionizing Radiation

No specific hazard sources were documented in the DOEHRS or MESL from the 09 October 2011 through 30 June 2013 timeframe.

## 6 Endemic Disease

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

### 6.1 Foodborne and Waterborne Diseases

Food borne and waterborne diseases in the area were transmitted through the consumption of local food and water. Local unapproved food and water sources (including ice) were heavily contaminated with pathogenic bacteria, parasites, and viruses to which most U.S. Service Members had little or no natural immunity. Effective host nation disease surveillance did not exist within the country. Only a small fraction of diseases were identified or reported in host nation personnel. Diarrheal diseases were expected to temporarily incapacitate a very high percentage of U.S. personnel within days if local food,

water, or ice were consumed. Hepatitis A and typhoid fever infections typically caused prolonged illness in a smaller percentage of unvaccinated personnel. Vaccinations were 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 have occurred. Key disease risks are summarized below:

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

#### 6.1.1 Diarrheal diseases (bacteriological)

**High, mitigated to Low:** Diarrheal diseases were 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 have facilitated person-to-person spread and epidemics. Typically mild disease were treated in outpatient setting; recovery and return to duty in less than 72 hours with appropriate therapy. A small proportion of infections may have required greater than 72 hours limited duty, or hospitalization.

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

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

#### 6.1.3 Polio

**Low:** Potential health risk to U.S. personnel is Low. Despite a concerted global eradication campaign, poliovirus continues to affect children and adults in Afghanistan, Pakistan and some African countries. 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 Risks:

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

#### 6.1.5 Long-term Health Risks:

**None identified based on available data.**

## 6.2 Arthropod Vector-Borne Diseases

During the warmer months, the climate and ecological habitat supported populations of arthropod vectors, including mosquitoes, ticks, mites, and sandflies. Significant disease transmission was sustained countrywide, including urban areas. Malaria, the major vector-borne health risk in Afghanistan, was 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** Potential unmitigated risk to U.S. personnel was High during warmer months (typically April through November) but reduced to low with mitigation measures. Malaria incidents were 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 have occurred among personnel exposed to mosquito (*Anopheles* spp.) bites. Malaria incidents may have caused debilitating febrile illness typically requiring 1 to 7 days of inpatient care, followed by return to duty. Severe cases may have required intensive care or prolonged convalescence.

### 6.2.2 Leishmaniasis

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

### 6.2.3 Crimean-Congo hemorrhagic fever

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

### 6.2.4 Sandfly fever

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

### 6.2.5 Plague

**Low:** Potential health risk to U.S. personnel was 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 were 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 have developed into secondary pneumonic plague. Respiratory transmission of pneumonic plague was rare but has the potential to cause significant outbreaks. Close contact was usually required for transmission. In situations where respiratory transmission of plague was suspected, weaponized agent must be considered. Extremely rare cases (less than 0.01% per month attack rate) could have occurred. Incidence could have resulted in potentially severe illness which may have required more than 7 days of hospitalization and convalescence.

#### 6.2.6 Typhus-miteborne (scrub typhus)

**Moderate, mitigated to Low:** Potential health risk to U.S. personnel was Moderate during warmer months (typically March through November) when vector activity was highest. Mitigation measures reduced the risk to low. Mite-borne typhus was 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 was 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 have included sandy beaches, mountain deserts, cultivated rice fields, and rain forests. Although data were insufficient to assess potential disease rates, attack rates could have been very high (over 50%) in groups of personnel exposed to heavily infected "mite islands" in focal areas. The disease could have caused debilitating febrile illness typically requiring 1 to 7 days of inpatient care, followed by return to duty.

#### 6.2.7 West Nile fever

**Low:** West Nile fever was present. The disease was 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 could have occurred. This disease was associated with a low risk estimate.

#### 6.2.8 Short -term health risks:

**Low:** The unmitigated health risk estimate was High for malaria (infection rate of less than 1% per month), Moderate for leishmaniasis-cutaneous (acute), Crimean-Congo hemorrhagic fever, sandfly fever, typhus-miteborne; and Low for, the plague and West Nile fever. Health risk was reduced to low by proper wear of the uniform, application of repellent to exposed skin, and appropriate chemoprophylaxis. Confidence in health risk estimate was high.

#### 6.2.9 Long-term health risks:

**Low:** The unmitigated risk was 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 was high.

### 6.3 Water Contact Diseases

Operations or activities that involved extensive water contact may have resulted in personnel being temporarily debilitated with leptospirosis in some locations. Leptospirosis health risk typically increased during flooding. In addition, although not specifically assessed in this document, bodies of surface water were likely to be contaminated with human and animal waste. Activities such as wading or swimming may have resulted in exposures to enteric diseases such as diarrhea and hepatitis via

incidental ingestion of water. Prolonged water contact also may have led 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:** Human infections occurred seasonally (typically April through November) through exposure to water or soil contaminated by infected animals and was associated with wading, and swimming in contaminated, untreated open water. The occurrence of flooding after heavy rainfall facilitated the spread of the organism because as water saturates the environment leptospirosis present in the soil passes directly into surface waters. Leptospirosis can enter the body through cut or abraded skin, mucous membranes, and conjunctivae. Infection may have also occurred 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 included fever, chills, myalgia, nausea, diarrhea, cough, and conjunctival suffusion. Manifestations of severe disease could have included jaundice, renal failure, hemorrhage, pneumonitis, and hemodynamic collapse. Recreational activities involving extensive water contact may have resulted in personnel being temporarily debilitated with leptospirosis. Incidence could have resulted in debilitating febrile illness typically requiring 1 to 7 days of inpatient care, followed by return to duty; some cases may have required prolonged convalescence. This disease was associated with a Moderate health risk estimate.

### 6.3.2 Short-term health risks:

**Low:** Unmitigated Health risk of leptospirosis was Moderate during warmer months. Mitigation measures reduced the risk to Low. Confidence in the health risk estimate was high.

### 6.3.3 Long-term health risks:

**None identified based on available data.**

## 6.4 Respiratory Diseases

Although not specifically assessed in this document, deployed U.S. forces may have been exposed to a wide variety of common respiratory infections in the local population. These included influenza, pertussis, viral upper respiratory infections, viral and bacterial pneumonia, and others. The U.S. military populations living in close-quarter conditions were at risk for substantial person-to-person spread of respiratory pathogens. Influenza was 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 PPE when necessary for healthcare providers and detention facility personnel.

### 6.4.1 Tuberculosis (TB)

**Moderate, mitigated to Low:** Potential health risk to U.S. personnel was Moderate, mitigated to Low, year round. Transmission typically required close and prolonged contact with an active case of pulmonary or laryngeal tuberculosis (TB), although it also could have occurred with more incidental contact. The Army Surgeon General has defined increased risk in deployed Soldiers as indoor exposure to locals or third country nationals of greater than one hour per week in a highly endemic

active TB region. Additional mitigation included active case isolation in negative pressure rooms, where available.

#### 6.4.2 Meningococcal meningitis

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

#### 6.4.3 Short-term health risks:

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

#### 6.4.4 Long-term health risks:

**None identified based on available data.** Tuberculosis 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 Rabies

**Moderate, mitigated to Low:** 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 have occurred from scratches contaminated with the saliva. A U.S. Army Soldier died of rabies 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 1B, reduction of animal habitats, active pest management programs, and timely treatment of feral animal scratches/bites.

#### 6.5.2 Anthrax

**Low:** Anthrax cases were rare in indigenous personnel, and posed 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 have resulted in contracting gastrointestinal anthrax. Pulmonary anthrax was contracted through inhalation of spores and was 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

**Moderate, mitigated to Low:** Potential health risk to U.S. personnel was Moderate, but mitigated to Low, 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 have occurred in personnel with heavy exposure to barnyards or other areas where animals are kept. Unpasteurized milk may have also transmitted infection. The primary route of exposure was respiratory, with an infectious dose as low as a single organism. Incidence could have resulted in debilitating febrile illness, sometimes presenting as pneumonia, typically requiring 1 to 7 days of inpatient care followed by return to duty. Mitigation strategies in place as listed in paragraph 6.5.2 except for vaccinations.

#### 6.5.4 H5N1 avian influenza

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

#### 6.5.5 Short-term health risks:

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

#### 6.5.6 Long-term health risks:

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

## 7 Venomous Animal/Insect

All information was taken directly from the Clinical Toxinology Resources web site from the University of Adelaide, Australia (Reference 2). The species listed below had home ranges that overlap the location of Camp Spann and vicinity, and may have presented a health risk if personnel encountered them. 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

- *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*, *Compsobuthus rugosulus*, *Mesobuthus caucasicus*, *Mesobuthus eupeus*, *Mesobuthus macmahoni*, *Orthochirus bicolor*, *Orthochirus pallidus*, and *Orthochirus scrobiculosus*: There are a number of dangerous Buthid scorpions, but there are also some known to cause minimal effects only. Without clinical data it was 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 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

- *Boiga trigonata* (Common Cat Snake): Unlikely to cause significant envenoming; Bites by these rear fanged Colubrid snakes are rarely reported. They are likely to cause minimal to moderate local effects and no systemic effects.
- *Echis multisquamatus* (central Asian saw-scaled viper), *Gloydius halys* (Haly's Pit Viper): Severe envenoming possible, potentially lethal. Bites may cause moderate to severe coagulopathy and haemorrhagins causing extensive bleeding.
- *Hemorrhis ravergeri* (mountain racer) and *Psammophis lineolatus* (Teer snake): Unlikely to cause significant envenoming. Bites require symptomatic treatment only.
- *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 & 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.
- *Pseudocerastes persicus* (Persian dwarf snake): Unlikely to cause significant envenoming; limited clinical data suggest bites result in local effects 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 was low (Reference 10, Table 3-6).

### 7.5 Long-term health risk:

**None identified.**

## 8 Heat/Cold Stress

### 8.1 Heat

Summer (June - September) monthly mean temperatures ranged from 63 °F to 102 °F with an average temperature of 85 degrees Fahrenheit (°F) based on historical climatological data from the U.S. Air Force Combat Climatology Center, 14<sup>th</sup> Weather Squadron. The health risk of heat stress/injury based

on temperatures alone was Low (< 78 °F) from October – April and extremely high (≥ 88°F) from May – September. However, work intensity and clothing/equipment worn posed greater health risk of heat stress/injury than environmental factors alone (Reference 6). Managing risk of hot weather operations included monitoring work/rest periods, proper hydration, and taking individual risk factors (e.g. acclimation, weight, and physical conditioning) into consideration. Risk of heat stress/injury was reduced with preventive measures

#### 8.1.1 Short-term health risk:

**Low to Extremely High, mitigated to Low:** 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) was Extremely High from May – September and Low from October – April. The risk of heat injury was reduced to low through preventive measures such as work/rest cycles, proper hydration and nutrition, and monitoring WBGT. Confidence in the health risk estimate was low (Reference 10, Table 3-6).

#### 8.1.2 Long-term health risk:

**Low:** The long-term risk was Low. However, the risk may have been 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 were rare but may occur, especially from more serious injuries such as heat stroke. It was 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 was medium (Reference 10, Table 3-6).

## 8.2 Cold

#### 8.2.1 Short-term health risks:

Winter (December - March) temperatures ranged from 28 °F to 61 °F with an average temperature of 43 °F based on historical climatological data from the U.S. Air Force Combat Climatology Center, 14<sup>th</sup> Weather Squadron. Because even on warm days a significant drop in temperature after sunset by as much as 40 °F could have occurred, there was a risk of cold stress/injury from October – April. The risk assessment for Non-Freezing Cold Injuries (NFCI), such as chilblain, trench foot, and hypothermia, was Low based on historical temperature and precipitation data. Frostbite was unlikely to occur because temperatures rarely drop below freezing. However, personnel may have encountered significantly lower temperatures during field operations at higher altitudes. As with heat stress/injuries, cold stress/injuries were largely dependent on operational and individual factors instead of environmental factors alone.

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

#### 8.2.2 Long-term health risk:

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

## 9 Noise

### 9.1 Continuous

The generator farm at Camp Spann did not affect personnel who had no direct interaction with the generators. Personnel who worked at the generator farms used personal protective equipment to

mitigate exposure to noise (Reference 14).

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 the 09 October 2011 through 30 June 2013 timeframe.

9.2.1 Short-term and Long-term health risks:

**Not evaluated.**

# 10 Unique Incidents/Concerns

## 10.1 Potential environmental contamination sources

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

## 10.2 Waste Sites/Waste Disposal

Solid waste and wastewater was hauled off of Camp Spann, Camp Marmal, and Camp Hairatan and disposed of off-site. Burn pits and incinerators were not present on Camp Spann, Camp Marmal, and Camp Hairatan during the 09 October 2011 through 30 June 2013 timeframe (References 14,15, 16, and 17).

## 10.3 Fuel/petroleum products/industrial chemical spills

No specific hazard sources were documented in the DOEHRS or MESL from the 09 October 2011 through 30 June 2013 timeframe.

## 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. No specific hazard sources were documented in DOEHRS or MESL data portal. A total of 2 monthly pesticide application reports in the MESL data portal for Camp Spann and Camp Hairatan (March 2013) list the usage of pesticides on the site. For each pesticide product applied during this period, the EPA approved label has been archived, providing a framework how each pesticide handled and applied (see below).

#### 10.4.1 Rodenticides

Bromadiolone was used to control rodents.

#### 10.4.2 Insecticides

Insecticides used to control ants, drain flies, gnats, house flies, spiders, and wasps included: imidacloprid, pyrethrins, piperonyl butoxide, and z-9 tricosene.

#### 10.4.3 Short-term and Long-term health risks

**Low:** Long term health risk was Low. Confidence in the health risk assessment was low (Reference 10, Table 3-6).

### 10.5 Asbestos

No specific hazard sources were documented in the DOEHRS or MESL from the 09 October 2011 through 30 June 2013 timeframe.

### 10.6 Lead Based Paint

No specific hazard sources were documented in the DOEHRS or MESL from the 09 October 2011 through 30 June 2013 timeframe.

### 10.7 Burn Pit

Burn pits and incinerators were not present on Camp Spann, Camp Marmal, and Camp Hairatan during the 09 October 2011 through 30 June 2013 timeframe (References 14,15, 16, and 17). Fifty-five gallon burn barrels were used to burn paper and wood at Camp Spann (Reference 18) and Camp Hairatan (Reference 19). An incinerator used for the disposal of regulated medical waste is located on the German controlled portion of Camp Marmal (Reference 20).

## 11 References<sup>1</sup>

1. Casarett and Doull's Toxicology: the Basic Science of Exposures, Chapter 2- Principles of Toxicology; Fifth Edition, McGraw Hill, New York.
2. Clinical Toxinology Resources: <http://www.toxinology.com/>. University of Adelaide, Australia.
3. Defense Occupational and Environmental Health Readiness System (referred to as the DOEHRS-EH database) at <https://doehrs-ih.csd.disa.mil/Doehrs/>. Department of Defense (DoD) Instruction 6490.03, *Deployment Health*, 2006.
4. DoDI 6055.05, Occupational and Environmental Health, 2008.
5. DoD MESL Data Portal: <https://mesl.apgea.army.mil/mesl/>. Some of the data and reports used may be classified or otherwise have some restricted distribution.
6. Goldman RF. 2001. Introduction to heat-related problems in military operations. *In*: Textbook of military medicine: medical aspects of harsh environments Vol. 1, Pandolf KB, and Burr RE (Eds.), Office of the Surgeon General, Department of the Army, Washington DC.
7. IOM (Institute of Medicine). 2011. Long-term health consequences of exposure to burn pits in Iraq and Afghanistan. Washington, DC: The National Academies Press.
8. Joint Staff Memorandum (MCM) 0017-12, Procedures for Deployment Health Surveillance, 2012.
9. National Center for Medical Intelligence (NCMI). 2011. Defense Intelligence Report: (U) Baseline Infectious Disease Risk Assessment CENTCOM: Afghanistan. Defense Intelligence Agency, <https://www.intelink.gov/ncmi/index.php>.
10. USAPHC TG230, June 2013 Revision.
11. USACHPPM. 2008. Particulate Matter Factsheet; 64-009-0708, 2008.
12. Modification 12 to United States Central Command Individual Protection and Individual Unit Deployment Policy, 2 December 2013.
13. CDC. 2012. Morbidity and Mortality Weekly Report. Imported Human Rabies in a U.S. Army Soldier. May 4, 2012. 61(17); 302-305.

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<sup>1</sup> NOTE. The data are currently assessed using the 2013 TG230. The general method involves an initial review of the data which eliminates all chemical substances not detected above 1-yr negligible MEGs. Those substances screened out are not considered acute or chronic health hazards so are not assessed further. For remaining substances, acute and chronic health effects are evaluated separately for air water (soil is only evaluated for long term risk). This is performed by deriving separate short-term and long term population exposure level and estimates (referred to as population exposure point concentrations (PEPC)) that are compared to MEGs derived for similar exposure durations. If less than or equal to negligible MEG the risk is Low. If levels are higher than negligible then there is a chemical-specific toxicity and exposure evaluation by appropriate SMEs, which includes comparison to any available marginal, critical or catastrophic MEGs. For drinking water 15 L/day MEGs are used for the screening while site specific 5-15 L/day are used for more detailed assessment. For nondrinking water (such as that used for personal hygiene or cooking) the 'consumption rate' is limited to 2 L/day (similar to the EPA) which is derived by multiplying the 5 L/day MEG by a factor of 2.5. This value is used to conservatively assess non drinking uses of water.

14. Occupational and Environmental Health Site Assessment. Camp Mike Spann. December 2011.
15. Occupational and Environmental Health Site Assessment. Site: Camp Marmal, Afghanistan. Date: 6 January 2012.
16. Occupational and Environmental Health Site Assessment. FOB Hairatan. September 2011.
17. Occupational and Environmental Health Site Assessment. Camp Mike Spann Mazar-e Sharif, Balk Province, Afghanistan. November 2010.
18. Occupational and Environmental Health Site Assessment. Camp Spann. May 2013.
19. Occupational and Environmental Health Site Assessment. Camp Hairatan. May 2013.
20. Occupational and Environmental Health Site Assessment. Camp Marmal. November 2012.

## 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/afri/711hpw/usafsam/>

**DoD Health Readiness Policy and Oversight (HRP&O)** Phone: (800) 497-6261. <https://health.mil/Military-Health-Topics/Health-Readiness>