

Military Deployment
Periodic Occupational and Environmental Monitoring Summary (POEMS):
Camp Spann and vicinity, Afghanistan
Calendar Years: (2003 to 2011)

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

PURPOSE: This POEMS documents the Department of Defense (DoD) assessment of occupational and environmental health (OEH) risk for Camp Spann and vicinity that includes Camp Marmal, Camp Jordania, Camp Meymaneh and Forward Operating Base (FOB) Hairatan, Afghanistan. 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 12 November 2003 through 08 October 2011 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 12 November 2003 through 08 October 2011.

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 Jordania, and FOB Hairatan are located in northern Afghanistan in the Balkh province. Camp Spann is located inside the northwestern corner of an Afghanistan National Army (ANA) Training Base (Camp Shaheen) on the southwestern edge of the city of Mazār-e Sharīf. There is a concrete batch plant adjacent to the western wall. Camp Jordania is located near Camp Spann. Mazār-e-Sharīf is the fourth largest city of Afghanistan, with a population of about 375,000 as of 2006. The city is 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 Mazār-e Sharīf are used for agriculture and grazing with the Hindu Kush Mountain range (2000 m high) to the south.

Camp Marmal is 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 is well developed, complete with water treatment and wastewater treatment systems. The German area of the camp has 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 is located approximately 60 km north of Mazar-e Sharif close to the city of Termez, on the Amu Darya River. The river forms the border with Uzbekistan, and the two nations are connected by the Afghanistan–Uzbekistan Friendship Bridge.

Camp Meymaneh is 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 is located at the northern foot of the Torkestan Range at an elevation of 877 m on the old terrace of the Qeyzar or Meymaneh River. The highlands of the Meymaneh region generally possess very rich topsoil which supports seasonal agricultural activities.

SUMMARY: Conditions that may pose a Moderate or greater health risk are summarized in Table 1. Table 2 provides population based risk estimates for identified OEH conditions at Camp 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 hazards may be associated with potential health effects in some personnel during deployment at Camp Spann and vicinity that includes Camp Marmal, Camp Jordania, Camp Meymaneh and FOB Hairatan:

Inhalable coarse particulate matter less than 10 micrometers in diameter (PM10); inhalable fine particulate matter less than 2.5 micrometers in diameter (PM2.5); 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 and bed net, 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 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, and mitigation.

Air quality: For PM10 and PM2.5, 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 PM10 and PM2.5, 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. 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, Camp Marmal, Camp Jordania, Camp Meymaneh and FOB Hairatan. 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 following hazards may be associated with potential chronic health effects in some personnel during deployment at Camp Spann and vicinity that includes Camp Marmal, Camp Jordania, Camp Meymaneh and FOB Hairatan:

The hazards associated with potential long-term health effects at Camp Spann, Camp Marmal, Camp Jordania, Camp Meymaneh and FOB Hairatan include inhalable fine particulate matter less than 2.5 micrometers in diameter (PM2.5).

Air Quality: For inhalational exposure to high levels of dust and particulate matter, 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 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 Jordania, Camp Meymaneh and FOB Hairatan^{1,2}

Source of Identified Health Risk ³	Unmitigated Health Risk Estimate ⁴	Control Measures Implemented	Residual Health Risk Estimate ⁴
AIR			
Particulate matter less than 10 micrometers in diameter (PM ₁₀)	Short-term: Low to Moderate, Daily levels vary, acute health effects (e.g., upper respiratory tract irritation) more pronounced during peak days. More serious effects are possible in susceptible persons (e.g., those with asthma/existing respiratory diseases).	Limiting strenuous physical activities when air quality is especially poor; and actions such as closing tent flaps, windows, and doors.	Short-term: Low to Moderate, Daily levels vary, acute health effects (e.g., upper respiratory tract irritation) more pronounced during peak days. More serious effects are possible in susceptible persons (e.g., those with asthma/existing respiratory diseases).
	Long-term: No health guidelines		Long-term: No health guidelines
Water			
Consumed Water (Water Used for Drinking)	Short-term: No data available	U.S. Army Public Health Command (USAPHC) former U.S. Army Veterinary Command (VETCOM) approved bottled water and potable water only from approved water sources	Short-term: Low
	Long-term: No data available		Long-term: Low
Water for Other Purposes	Short-term: Low health risk for ROWPU-treated water (non-drinking) at Camp Spann and untreated water (non-drinking) at Camp Jordania from exposure to magnesium may be associated with increased incidences of laxative effects, which could lead to performance-degrading dehydration.	Water treated in accordance with standards applicable to its intended use	Short-term: Low health risk for ROWPU-treated water (non-drinking) at Camp Spann and untreated water (non-drinking) at Camp Jordania from exposure to magnesium may be associated with increased incidences of laxative effects, which could lead to performance-degrading dehydration.
	Long-term: : None identified based on available sample data.		Long-term: : None identified based on available sample data.
ENDEMIC DISEASE			
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) if ingesting local food/water, the health effects can temporarily incapacitate personnel (diarrhea) or result in prolonged illness (hepatitis A, Typhoid 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, Moderate for leishmaniasis - cutaneous (acute), Crimean-Congo hemorrhagic fever, sandfly fever, typhus-miteborne; 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 and appropriate chemoprophylaxis.	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

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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 are further reduced in the event of assessed contact by prompt post-exposure rabies prophylaxis IAW The Center for Disease Control's (CDC) Advisory Committee on Immunization Practices guidance.	Short-term: No data available
	Long-term: Low (Rabies)		Long-term: No data available
VENOMOUS ANIMAL/ INSECTS			
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 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 in unacclimatized or susceptible personnel is Moderate for May-September and Low 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			
Pesticides/Pest Control	Short-term: Low health risk from pesticide exposure.	See Section 10.4	Short-term: Low health risk from pesticide exposure.
	Long-term: Low health risk from pesticide exposure.		Long-term: Low health risk from pesticide exposure.

¹This 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 Jordania, Camp Meymaneh and FOB Hairatan. 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 12 November 2003 through 08 October 2011. 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.

³This 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 USAPHC/U.S. Army Institute of Public Health (AIPH). Where applicable, "None Identified" is used when though a potential exposure is identified, and no health risks of either a specific acute or chronic health effects are determined. More detailed descriptions of OEH exposures that are evaluated but determined to pose no health risk are discussed in the following sections of this report.

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 Camp Spann, 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 Technical Guide 230, *Environmental Health Risk Assessment and Chemical Exposure Guidelines for Deployed Military Personnel* (USAPHC TG 230). 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 is situated in a dusty semi-arid desert environment. Inhalational exposure to high levels of dust and particulate matter, such as during high winds or dust storms, may result in mild to more serious short-term health effects (e.g., eye, nose or throat and lung irritation) in some personnel. Additionally, certain subgroups of the deployed forces (e.g., those with pre-existing asthma/cardio pulmonary conditions) are at greatest risk of developing notable health effects.

2.2 Particulate matter

Particulate matter (PM) is a complex mixture of extremely small particles suspended in the air. The PM includes solid particles and liquid droplets emitted directly into the air by sources such as: power plants, motor vehicles, aircraft, generators, construction activities, fires, and natural windblown dust. The PM can include sand, soil, metals, volatile organic compounds (VOC), allergens, and other compounds such as nitrates or sulfates that are formed by condensation or transformation of combustion exhaust. The PM composition and particle size vary considerably depending on the source. Generally, PM of health concern is divided into two fractions: PM₁₀, 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 10 micrometers (PM₁₀)

2.3.1 Exposure Guidelines:

Short Term (24-hour) PM₁₀ (µg/m³):

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

Long-term PM₁₀ MEG (µg/m³):

- Not defined and not available.

2.3.2 Sample data/Notes:

Camp Spann: A total of 26 valid PM₁₀ air samples were collected from 15 August 2006 to 7 February 2011. The range of 24-hour PM₁₀ concentrations was 7 µg/m³ – 566 µg/m³ with an average concentration of 146 µg/m³.

Camp Marmal: A total of 34 valid PM₁₀ air samples were collected from 7 March 2010 to 19 October 2011. The range of 24-hour PM₁₀ concentrations was 27 µg/m³ – 360 µg/m³ with an average concentration of 163 µg/m³.

FOB Hairatan: A total of 3 valid PM₁₀ air samples were collected from 3 March to 1 June 2011. The range of 24-hour PM₁₀ concentrations was 48 µg/m³ – 174 µg/m³ with an average concentration of 95 µg/m³. Although the average and peak PM₁₀ concentrations were below the short-term PM₁₀ negligible MEG, data were insufficient to characterize health risk associated with PM₁₀ exposure.

2.3.3 Short-term health risks:

Low to Moderate: The average PM₁₀ concentrations at Camp Spann and Camp Marmal were below the short-term PM₁₀ negligible MEG and were not considered health risk hazards. The short-term risk assessment for peak PM₁₀ concentrations at Camp Spann and Camp Marmal were Moderate and Low, respectively. Therefore, PM₁₀ was not expected to pose a short-term health risk to personnel on typical days, but peak exposures could have occurred, increasing the health risk level. A Moderate health risk suggests that mission capabilities may have been degraded, and may have required limited in-theater medical countermeasures and resources, whereas a Low health risk suggests little or no impact on accomplishing the mission, and no in-theater medical resources for protection and treatment (Reference 9, Table 3-2). Results show the daily average health risk levels for PM₁₀ at Camp Spann and Camp Marmal (respectively) had no hazard for 92% and 85%, low health risk for 4% and 15%, and moderate health risk for 4% and 0% of the time. Confidence in the short-term PM₁₀ health risk assessment was low (Reference 9, Table 3-6).

For the highest observed PM₁₀ concentration at Camp Spann and Camp Marmal (respectively), the hazard severity was marginal and negligible. During peak exposures at the marginal hazard severity level, a majority of personnel may have experienced notable eye, nose, and throat irritation and some respiratory effects (Reference 9, Table 3-10). Some lost duty days were expected. Significant aerobic activity during peak exposure periods may have increased risk. During peak exposures at the negligible hazard severity level, a few personnel may have experienced notable eye, nose, and throat irritation; most personnel would have experienced only mild effects (Reference 9, Table 3-10). Those with a history of asthma or cardiopulmonary disease are expected to experience increased symptoms at the marginal and negligible hazard severity levels.

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 PM₁₀ due to an inability to clearly link chronic health effects with chronic PM₁₀ exposure levels.

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

2.4.1 Exposure Guidelines:

Short Term (24-hour) PM_{2.5} (µg/m³):

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

Long-term (1year) PM_{2.5} MEGs (µg/m³):

- Negligible MEG = 15
- Marginal MEG = 65.

2.4.2 Sample data/Notes:

Camp Spann: A total of 8 valid PM_{2.5} air samples were collected from 19 August 2006 to 17 February 2009. No samples were available from 2008. The range of 24-hour PM_{2.5} concentrations was 40 µg/m³ – 85 µg/m³ with an average concentration of 57 µg/m³. The average PM_{2.5} concentration was below the short-term PM_{2.5} negligible MEG and the peak PM_{2.5} concentration was at the negligible hazard severity MEG level. However, data were insufficient to characterize health risk associated with PM_{2.5} exposure.

Camp Marmal: A total of 4 valid PM_{2.5} air samples were collected from 7 - 10 March 2010. The range of 24-hour PM_{2.5} concentrations was 29 µg/m³ – 161 µg/m³ with an average concentration of 69 µg/m³. The average and peak PM_{2.5} concentrations were at the negligible hazard severity MEG level. However, data were insufficient to characterize health risk associated with PM_{2.5} exposure.

2.4.3 Short and long-term health risks:

None identified based on the available sampling data. Data were insufficient to characterize health risk associated with PM_{2.5} exposure.

2.5 Airborne Metals

2.5.1 Sample data/Notes:

Camp Spann: A total of 26 valid PM₁₀ samples collected from 15 August 2006 to 7 February 2011 were analyzed for metals.

Camp Marmal: A total of 34 valid PM₁₀ samples collected from 7 March 2010 to 19 October 2011 were analyzed for metals.

FOB Hairatan: A total of 3 valid PM₁₀ samples collected from 3 March to 1 June 2011 were analyzed for metals.

2.5.2 Short and long-term health risks:

None identified based on the available sampling data. No metals from PM₁₀ samples from Camp Spann, Camp Marmal, or FOB Hairatan had a peak population exposure point concentration (PEPC) greater than their respective 1-year negligible MEG and therefore, are not considered a health hazard. However, data from FOB Hairatan were insufficient to characterize health risk associated with airborne metal concentrations.

2.6 Volatile Organic Compounds (VOC)

2.6.1 Sample data/Notes:

The health risk assessment is based on average and peak concentration of 2 valid volatile organic chemical (VOC) air samples collected from Camp Spann on 24 August 2006, and the likelihood of exposure. None of the analyzed VOC pollutants were found at concentrations above short or long-term MEGs.

2.6.2 Short and long-term health risks:

None identified based on the available sampling data. No parameters exceeded 1-year Negligible MEGs. However, data were insufficient to characterize health risk associated with VOC concentrations.

3 Soil

3.1 Site-Specific Sources Identified

Camp Spann was covered with rock aggregate (brought in from another location) over a silt-clay soil.

Camp Marmal had sandy-loam soil with small aggregate in the soil. Prior use was pasture for nomadic sheep herds.

3.2 Sample data/Notes:

The primary soil contamination exposure pathways were dermal contact and dust inhalation. Typical parameters analyzed for included semi-volatile organic compounds (SVOC), heavy metals, polychlorinated biphenyls (PCB), pesticides, herbicides, and radionuclides. If the contaminant was known or suspected, other parameters may have been analyzed (i.e. total petroleum hydrocarbons (TPH) and polycyclic aromatic hydrocarbons (PAH) near fuel spills). For the risk assessment, personnel are assumed to remain at these locations for 6 months to 1 year.

Camp Spann: A total of 11 valid surface soil samples were collected from 04 July 2006 to 12 June 2008 to assess OEH health risk to deployed personnel. No samples were available from 2007. The percent of the population exposed to soil and associated dust in the sampled areas was > 75% for 10 samples, and 50 – 75% for 1 sample.

Camp Marmal: A total of 12 valid surface soil samples were collected from 10 March 2010 to 07 October 2011 to assess OEH health risk to deployed personnel. The percent of the population exposed to soil and associated dust in the sampled areas was > 75% for 4 samples, 25 <50% for 1 sample, and 10 > 25% for 7 samples.

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:

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 are based on the administrative information provided on the field data sheets submitted with the samples taken over the time period being evaluated. Based on field data sheets from Camp Spann, Camp Marmal, Camp Meymaneh and FOB Hairatan, samples for untreated water were associated with source water for treatment and no exposure pathways were associated with these samples. Therefore, untreated samples were not assessed as potential health hazards. However, the field data sheet from Camp Jordania indicated that

water was not treated prior to non-drinking exposure. Thus, the Camp Jordania untreated water sample data were assessed for potential health hazards. It was assumed that 100% of all U.S. personnel were directly exposed to Reverse Osmosis Water Purification Unit (ROWPU) and/or disinfected treated water (Camp Spann, Camp Marmal, Camp Meymaneh) or untreated water (Camp Jordania), since this classification of water was primarily used for personal hygiene, showering, cooking, and for use at vehicle wash racks. Field data sheets indicate that bottled water is the only approved source of drinking water.

4.1 Non-Drinking Water: Disinfected and Untreated

4.1.1 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.

Camp Spann: No on site well. Water was supplied to Camp Shaheen via pipeline from the Qala-i-Janghi Prison (several kilometers to the northwest) then pumped to Camp Spann water point for distribution. Water was distributed in one of two ways; it was chlorinated and distributed via plumbing to various showers and latrines throughout "old Spann" (eastern half of Camp Spann) and to the wash racks, or it was passed through one of two ROWPU units, chlorinated and distributed. One ROWPU was located on "old Spann", and distributes water to the "old Spann" dining facility (DFAC) and the dental clinic. The ROWPU on "new Spann" (western "expansion" half of Camp Spann) distributes water only to the DFAC on "new Spann".

According to the field data sheet for the single sample at Camp Jordania, the water was not chlorinated before use. All personnel at this location were expected to be exposed to the untreated well water.

4.1.2 Sample data/Notes:

To assess the potential for adverse health effects to troops the following assumptions were made about dose and duration: 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. A total of 26 disinfected bulk and untreated water (Non-Drinking) samples from 2003 to 2011 were evaluated for this health risk assessment.

Camp Spann: A total of 18 ROWPU and/or treated (non-drinking) samples from 12 November 2003 to 01 February 2011 were evaluated for this health risk assessment. Magnesium was detected in 11 of 18 samples. The range of magnesium concentrations was 0.11 mg/L - 320 mg/L with an average concentration of 51 mg/L. The peak concentration was above short-term (non-drinking) MEG of 250 mg/L in a single sample. No other chemicals were detected at levels above the short or long-term MEGs.

Camp Marmal: A total of 5 ROWPU and/or treated (Non-Drinking) samples from 17 April 2010 to 08 October 2011 were evaluated for this health risk assessment. No chemicals were detected at levels above the short or long-term MEGs.

Camp Meymaneh: A total of 2 ROWPU and/or treated (Non-Drinking) samples from 30 May and 17 September 2008 were evaluated for this health risk assessment. No chemicals were detected at levels above the short or long-term MEGs.

Camp Jordania: A single untreated (Non-Drinking) sample from 25 May 2010 was evaluated for this health risk assessment. The concentration of magnesium (296 mg/L) was above short-term (non-drinking) MEG of 250 mg/L. No other chemicals were detected at levels above the short or long-term MEGs.

4.1.3 Short-term health risks:

The health risk from ROWPU-treated (non-drinking) water at Camp Spann, and untreated (non-drinking) water at Camp Jordania from exposure to magnesium in non-drinking water was Low. Incidental ingestion at the 5 L/day intake rate above the short-term (non-drinking) MEG for magnesium may be associated with increasing incidences of laxative effects, which could lead to performance-degrading dehydration, but the severity of these effects and the percentage of population that would experience them cannot be estimated from available data (TB MED 577). Confidence in the risk assessment was low (TG 230 Table 3-6).

4.1.4 long-term health risks:

None identified based on available sample data.

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 Environmental Surveillance Library (MESL) from 12 November 2003 through 08 October 2011.

5.2 Depleted Uranium (DU)

No specific hazard sources were documented in the DOEHRS, or MESL from 12 November 2003 through 08 October 2011.

5.3 Ionizing Radiation

No specific hazard sources were documented in the DOEHRS, or MESL from 12 November 2003 through 08 October 2011.

5.4 Non-Ionizing Radiation

No specific hazard sources were documented in the DOEHRS, or MESL from 12 November 2003 through 08 October 2011.

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) 11 (Reference 11) lists deployment requirements, to include immunizations and chemoprophylaxis, in effect during the timeframe of this POEMS.

6.1 Foodborne and Waterborne Diseases

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

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

6.1.1 Diarrheal diseases (bacteriological)

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

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

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

6.1.3 Short-term Health Risks:

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

6.1.4 Long-term Health Risks:

None identified based on available data.

6.2 Arthropod Vector-Borne Diseases

During the warmer months, the climate and ecological habitat support populations of arthropod vectors, including mosquitoes, ticks, mites, and sandflies. Significant disease transmission is sustained countrywide, including urban areas. Malaria, the major vector-borne health risk in Afghanistan, is

capable of debilitating a high percentage of personnel for up to a week or more. Mitigation strategies were in place and included proper wear of treated uniforms, application of repellent to exposed skin, and use of bed nets and chemoprophylaxis (when applicable). Additional methods included the use of pesticides, reduction of pest/breeding habitats, and engineering controls.

6.2.1 Malaria

High, mitigated to Low 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.

6.2.2 Leishmaniasis

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

6.2.3 Crimean-Congo hemorrhagic fever

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

6.2.4 Sandfly fever

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

6.2.5 Plague

Low: 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*)

Moderate, mitigated to Low: 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

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

6.2.9 Short-term health risks:

Low: The unmitigated health risk estimate is 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 is 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.

6.2.10 Long-term health risks:

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

6.3 Water Contact Diseases

Operations or activities that involve extensive water contact may result in personnel being temporarily debilitated with leptospirosis in some locations. Leptospirosis health risk typically increases during flooding. In addition, although not specifically assessed in this document, bodies of surface water are likely to be contaminated with human and animal waste. Activities such as wading or swimming may result in exposures to enteric diseases such as diarrhea and hepatitis via incidental ingestion of water. Prolonged water contact also may lead to the development of a variety of potentially debilitating skin conditions such as bacterial or fungal dermatitis. Mitigation strategies were in place and included avoiding water contact and recreational water activities, proper wear of uniform (especially footwear), and protective coverings for cuts/abraded skin.

6.3.1 Leptospirosis

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

6.3.2 Short-term health risks:

Low: Unmitigated Health risk of leptospirosis is Moderate during warmer months. Mitigation measures reduce the risk to Low. Confidence in the health risk estimate is 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 be exposed to a wide variety of common respiratory infections in the local population. These include influenza, pertussis, viral upper respiratory infections, viral and bacterial pneumonia, and others. The U.S. military populations living in close-quarter conditions are at risk for substantial person-to-person spread of respiratory pathogens. Influenza is of particular concern because of its ability to debilitate large numbers of unvaccinated personnel for several days. Mitigation strategies were in place and included routine medical screenings, vaccination, enforcing minimum space allocation in housing units, implementing head-to-toe sleeping in crowded housing units, implementation of proper personal protective equipment (PPE) when necessary for healthcare providers and detention facility personnel.

6.4.1 Tuberculosis (TB)

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

6.4.2 Meningococcal meningitis

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

6.4.3 Short-term health risks:

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

6.4.4 Long-term health risks:

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

6.5 Animal-Contact Diseases

6.5.1 Rabies

Moderate, mitigated to Low: Rabies posed a year-round moderate risk. 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 stationed in Afghanistan died of rabies on 31 August 2011 (Reference 12). 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 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

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

6.5.4 H5N1 avian influenza

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

6.5.5 Short-term health risks:

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

6.5.6 Long-term health risks:

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

7 Venomous Animals

All information was taken directly from the Clinical Toxinology Resources web site from the University of Adelaide, Australia (Reference 2). The species listed below have home ranges that overlap the location of Camp Spann 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

- *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 also others 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 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) and *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.

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 9, Table 3-6).

7.5 Long-term health risk:

None identified.

8 Heat/Cold Stress

8.1 Heat

Summer (June - September) monthly mean daily maximum temperatures range from 63 °F to 102 °F with an average temperature of 85 °F based on historical climatological data from the U.S. Air Force Combat Climatology Center, 14th Weather Squadron. The health risk of heat stress/injury based on temperatures alone is Low (< 78 °F) from October – April, and extremely high (≥ 88°F) from May - September. However, work intensity and clothing/equipment worn pose greater health risk of heat stress/injury than environmental factors alone (Reference 6). Managing risk of hot weather operations included monitoring work/rest periods, proper hydration, and taking individual risk factors (e.g. acclimation, weight, and physical conditioning) into consideration. Risk of heat stress/injury was reduced with preventive measures

8.1.1 Short-term health risk:

Low to High, mitigated to Low: The risk of heat injury was reduced to low through preventive

measures such as work/rest cycles, proper hydration and nutrition, 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 May – September and Low all other months. Confidence in the health risk estimate is low (Reference 9, Table 3-6).

8.1.2 Long-term health risk:

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

8.2 Cold

8.2.1 Short-term health risks:

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

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

8.1.2 Long-term health risk:

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

9 Noise

9.1 Continuous

The Barrier generator farm on the west side of Camp Spann was reported as loud enough to be a nuisance, but able to have conversations at normal volume around other locations (OEHSA Camp Spann, 2010). Controls at other locations include: generator farm on east side surrounded by double stacked HESCO® barriers, and muffled commercial generator near living tents (HESCO is a registered trademark of HESCO Bastion Ltd).

9.1.1 Short and long-term health risks:

Not evaluated. Insufficient quantity and quality of data were available for an accurate health risk assessment.

9.2 Impulse

No specific hazard sources were documented in the DOEHRS or MESL from 12 November 2003 through 08 October 2011.

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

Lack of proper sanitation at the bulk trash point significantly contributed to the filth fly, rodent, and feral animal populations at Camp Spann, Camp Marmal, Camp Meymaneh, and FOB Hairatan. Recommendations were made to have dumpsters with tight fitting lids; they also needed to be emptied more often to prevent overfilling or increase the amount of dumpsters per trash collection point to alleviate overfilling.

All waste material (Hazardous materials, solid, and grey/black water) was removed from site for disposal from Camp Marmal and Camp Spann (Marmal OEHSA March 2010; Spann OEHSA November 2010). Waste material was likely disposed in the same manner at the remaining sites, but could not be confirmed with available reports.

10.2.1 Short-term and Long-term health risks

Not evaluated. Insufficient quantity and quality of data were available for an accurate health risk assessment.

10.3 Food Sanitation

A search of the DOEHRS and MESL from 1 January 2002 to 30 November 2011 yielded limited food sanitation inspection records at Camp Spann, Camp Marmal, and Camp Meymaneh for 2004, 2008, 2010 and 2011. Food sanitation deficiencies found at Camp Spann and Camp Marmal are summarized below:

Deficiencies reported at Camp Spann include: Improper cold temperatures (refrigeration units; serving line), improper sanitation of cookware, lack of hand washing signs and stations. Deficiencies reported at Camp Marmal include: A DFAC tent received an unsatisfactory rating for the routine food service establishment inspection conducted on 19 July 2010. Subsequent inspections were rated marginal and satisfactory. Another DFAC Tent inspection was conducted on 18 October 2010 with marginal ratings that required multiple follow up meetings to correct all issues. The issues were related to grey water, grease trap, filth flies and pigeons. The FLUOR® Inc. contractors took over management of the U.S. DFAC to maintain and improve food service capabilities (FLUOR is a registered trademark of the Fluor Corporation). The German DFAC was inspected on 15 July 2010 and the overall rating was Excellent. All areas were inspected and there was evidence of strict cleaning and sanitation enforcement. Deficiencies (grey water, grease traps, filth flies, pigeons) associated with U.S. DFAC are summarized below.

- Grey water was found surfacing on the North side of the DFAC resulting in bad odors, potential breeding grounds for filth flies, and mosquito breeding ground in warmer weather. Grey water surfacing was probably caused by clogged underground grey-water lines that were the cause of the grease-trap issue.
- The grease trap was used to remove non-emulsified grease from the DFAC wastewater discharge lines; waste grease from cooking and food waste was occasionally dumped into the grease trap. The German employees cleaned out the grey water lines near the DFAC several times; however DFAC personnel continued to dump liquid grease from cooking, and food waste into the grease trap resulting in grey water surfacing on the north side of DFAC. The grey water resulted in bad odors, potential breeding grounds for filth flies and mosquitoes.
- Filth flies were common in the eating area, kitchen, and grease trap/waste area. Recommendations made to correct the filth fly issue included: provide lids for trash receptacles, clean up food waste and grease in the vicinity of the grease barrels, ensure grease barrels were covered at all times, and resolve the grease trap issue, i.e. standing water would dry up thus eliminating one source of the filth flies.
- Pigeons were commonly found within the eating area. Pigeons potentially carry multiple human diseases and need to be excluded from entry into food consumption area. Recommendations were made to exclude the pigeons from the DFAC eating area by keeping the doors shut. Pigeons were also entering through spaces at the ends of the eating area tent (where the heater ducts enter the tent); it was recommended to sand-bag, or otherwise close off these areas to avoid pigeon entry.

10.3.1 Short-term and Long-term health risks

Not evaluated. Insufficient quantity and quality of data were available for an accurate health risk assessment.

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 four monthly pesticide application reports in the MESL data portal for Camp Spann (May 2006 to January 2007) 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

Brodifacoum and bromadiolone were used to control rodents.

10.4.2 Insecticides

Insecticides used to control ants, bees, crickets, fleas, flies, lice, mosquitoes, spiders, termites, and wasps include: pyrethrins, β -cyfluthrin, methomy, (z)-9- tricosene, bifenthrin, polybutylenes, piperonyl butoxide, n-octyl bicycloheptene dicarboximide, and polyisobutylenes.

10.4.3 Herbicides

Glyphosate was used to control weeds.

10.4.4 Short-term and Long-term health risks

Low: Long term health risk is Low. Confidence in the health risk assessment is medium (Reference 9, Table 3-6).

10.5 Asbestos

No specific hazard sources were documented in the DOEHRS or MESL from 12 November 2003 through 08 October 2011.

10.6 Lead Based Paint

No specific hazard sources were documented in the DOEHRS or MESL from 12 November 2003 through 08 October 2011.

10.7 Burn Pit

No burn pit samples were provided for evaluation. While not specific to Camp Spann and vicinity, the consolidated epidemiological and environmental sampling and studies on burn pits that have been conducted as of the date of this publication have been unable to determine whether an association does or does not exist between exposures to emissions from the burn pits and long-term health effects (Reference 7). The committee's review of the literature and the data suggests that service in Iraq or Afghanistan (i.e., a broader consideration of air pollution than exposure only to burn pit emissions) may be associated with long-term health effects, particularly in susceptible (e.g., those who have asthma) or highly exposed subpopulations, such as those who worked at the burn pit. Such health effects would be due mainly to high ambient concentrations of PM from both natural and anthropogenic sources, including military sources. If that broader exposure to air pollution turns out to be relevant, potentially related health effects of concern are respiratory and cardiovascular effects and cancer. Susceptibility to the PM health effects could be exacerbated by other exposures, such as stress, smoking, local climatic conditions, and co-exposures to other chemicals that affect the same biologic or chemical

processes. Individually, the chemicals measured at burn pit sites in the study were generally below concentrations of health concern for general populations in the United States. However, the possibility of exposure to mixtures of the chemicals raises the potential for health outcomes associated with cumulative exposure to combinations of the constituents of burn pit emissions and emissions from other sources.

11 References¹

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11. Modification 11 to United States Central Command Individual Protection and Individual Unit Deployment Policy, 2 December 2011.
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¹ NOTE. The data are currently assessed using the 2010 TG230. The general method involves an initial review of the data which eliminates all chemical substances not detected above 1-yr negligible MEGs. Those substances screened out are not considered acute or chronic health hazards so are not assessed further. For remaining substances, acute and chronic health effects are evaluated separately for air water (soil is only evaluated for long term risk). This is performed by deriving separate short-term and long term population exposure level and estimates (referred to as population exposure point concentrations (PEPC)) that are compared to MEGs derived for similar exposure durations. If less than or equal to negligible MEG the risk is Low. If levels are higher than negligible then there is a chemical-specific toxicity and exposure evaluation by appropriate SMEs, which includes comparison to any available marginal, critical or catastrophic MEGs. For drinking water 15 L/day MEGs are used for the screening while site specific 5-15 L/day are used for more detailed assessment. For nondrinking water (such as that used for personal hygiene or cooking) the 'consumption rate' is limited to 2 L/day (similar to the EPA) which is derived by multiplying the 5 L/day MEG by a factor of 2.5. This value is used to conservatively assess non drinking uses of water.

12 Where Do I Get More Information?

If a provider feels that the Service member's or Veteran's current medical condition may be attributed to specific OEH exposures at this deployment location, he/she can contact the Service-specific organization below. Organizations external to DoD should contact DoD Force Health Protection and Readiness (FHP & R).

Army Institute of Public Health Phone: (800) 222-9698. <http://phc.amedd.army.mil/>

Navy and Marine Corps Public Health Center (NMCPHC) (formerly NEHC) Phone: (757) 953-0700. www.nmcp hc.med.navy.mil

U.S. Air Force School of Aerospace Medicine (USAFSAM) (formerly AFIOH) Phone: (888) 232-3764. <http://www.wpafb.af.mil/afri/711hpw/usafsam.asp>

DoD Force Health Protection and Readiness (FHP & R) Phone: (800) 497-6261. <http://fhp.osd.mil>