Military Deployment
Periodic Occupational and Environmental Monitoring Summary (POEMS): Jalalabad (Jalalabad Air Field (JAF)), Camp Duffman, Forward Operating Base (FOB) Fenty, FOB Hughie, FOB Finley-Shields, Camp Gamberi, and Nangarhar Province), Afghanistan: 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 base camp level occupational and environmental health (OEH) surveillance data for Jalalabad, Afghanistan, and vicinity. It presents the identified health risks and associated medical implications. The findings are based on information collected from 23 November 2003 through 15 February 2011, including OEH 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. While this assessment may reflect similar exposures and risks pertaining to historic or future conditions at this site, the underlying data were limited to the time period(s) and area(s) sampled and thus may not reflect fluctuations or unique occurrences. It also may not fully represent all fluctuations during the timeframe. To the extent data allowed, this summary describes the general ambient conditions at the site and characterizes the risks at the *population-level*. While useful to inform providers and others of potential health effects and associated medical implications, it does not represent an individual exposure profile. Actual individual exposures and specific resulting health effects depended on many variables and should have been addressed in individual medical records by providers as appropriate at the time of an evaluation of a unique exposure.

SITE DESCRIPTIONS: Jalalabad is located in the Nangarhar Province of Afghanistan and is the capital city of the province. Jalalabad is located at the junction of the Kabul and Kunar Rivers. The major industries located in Jalalabad included papermaking and agriculture. Jalalabad was the home location of the Jalalabad Provincial Reconstruction Team. This POEMS also addresses Jalalabad Air Field (JAF), Camp Duffman, Forward Operating Base (FOB) Fenty, FOB Hughie, FOB Finley-Shields, Camp Gamberi, and Nangarhar Province because they were located in close proximity to Jalalabad. FOB Finley-Shields and FOB Hughie were adjacent to each other and located 2.4 miles south of Jalalabad. The JAF was located 4.8 miles to the southeast of Jalalabad. It was the largest base in the area and FOB Fenty and Camp Duffman were located inside of the JAF. Camp Gamberi was approximately 10 miles north of Jalalabad.

SUMMARY: Summarized below are the health risks estimated to present a moderate or greater risk of medical concern and appropriate recommended follow-on medical actions, if any. The Table on the following page provides a list of all identified health risks at these locations and the vicinity (Table 1). As indicated in the detailed sections that follow the table, controls that have been effectively established to reduce risk levels have been factored into this overall assessment. In some cases, (e.g., ambient air) specific controls are not routinely available/feasible.

Short-term health risks & medical implications: The following may have caused acute health effects in some personnel *during deployment at Jalalabad (and the associated locations)*:

Food/waterborne diseases (e.g., bacterial diarrhea, Hepatitis A, Typhoid fever, diarrhea-cholera, diarrhea-protozoal, Brucellosis, Hepatitis E); other endemic diseases (malaria, cutaneous leishmaniasis, Crimean-Congo hemorrhagic fever, Sandfly fever, typhus-miteborne, Tuberculosis (TB), Rabies, Anthrax, Q fever); and venomous animals/insects. For food/waterborne diseases (e.g., bacterial diarrhea, Hepatitis A, Typhoid fever, diarrhea-cholera, diarrhea-protozoal, Brucellosis, Hepatitis E), if ingesting food and water off post, the health effects could have temporarily incapacitated personnel (diarrhea) or resulted in prolonged illness (Hepatitis A, Typhoid fever, and Brucellosis, Hepatitis E). Risks from food/waterborne diseases may have been reduced with preventive medicine controls and mitigation, which included 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 have constituted a significant risk due to exposure to biting vectors; risk was reduced to low by proper wearing of treated uniform, application of repellent to bed net and exposed skin, and appropriate chemoprophylaxis. 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) posed year-round risk. For venomous animals and insects, if encountered, effects of venom varied with species from mild localized effects (e.g. *Platyceps rhodorachis*) to potentially lethal effects (e.g. *Echis multisquamatus*); risk was reduced with proper and timely treatment.

Air quality: Although not enough air data samples of inhalable fine particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$) were available to evaluate short-term risk, the area was a dusty desert environment. In addition, there were burn pits on the site and located within 100 meters of troop housing area at JAF and located within 500 meters of troop housing at FOB Finley-Shields. A burn pit was operational at FOB Fenty until 2011 but the distance

to troop housing areas was unknown. For inhalational exposure to high levels of dust and particulate matter, such as during high winds or dust storms, and for exposure to burn pit smoke, exposures may have resulted 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, and certain subgroups of the deployed forces (e.g., those with pre-existing asthma/respiratory and cardio-pulmonary conditions) were at greatest risk of developing notable health effects. Although most effects from exposures to dust and particulate matter and burn pit smoke should have resolved post-deployment, providers should be prepared to consider the relationship between deployment exposures and current complaints. Some individuals may have sought treatment for acute respiratory irritation during their time at Jalalabad (and the associated locations). Personnel who reported with symptoms or required treatment while at this site should have exposure/treatment noted in medical record (e.g., in the 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 Jalalabad (and the associated locations) included visceral leishmaniasis infection. Leishmaniasis was transmitted by sandflies. Visceral leishmaniasis (a more latent form of the disease) caused a severe febrile illness, which typically required hospitalization with convalescence over 7 days. The leishmaniasis parasites may have survived for years in infected individuals. Consequently, this infection may have gone unrecognized until infections became symptomatic years later.

Air quality: Although not enough air data samples of inhalable fine particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$) were available to evaluate long-term risk, and fine particulate matter less than 10 micrometers in diameter (PM_{10}) was not evaluated due to no available health guidelines, the area was a dusty desert environment. In addition, though there were not burn pit samples available for long-term assessment, there were burn pits present on site and located within 100 meters of troop housing area at JAF and located within 500 meters of troop housing at FOB Finley-Shields. A burn pit was operational at FOB Fenty until 2011 but the distance to troop housing areas was unknown. For inhalational exposure to high levels of dust and particulate matter, such as during high winds or dust storms, and for exposure to burn pit smoke, it was considered possible that some otherwise healthy personnel who were exposed for a long-term period to dust and particulate matter and burn pit smoke could have developed certain health conditions (e.g., reduced lung function, cardiopulmonary disease). Personnel with a history of asthma or cardiopulmonary disease could potentially be more likely to develop such chronic health conditions. While the dust and particulate matter exposures and exposures to burn pit smoke were acknowledged, at this time there were no specific recommended, post-deployment medical surveillance evaluations or treatments. Providers should still consider overall individual health status (e.g., any underlying conditions/susceptibilities) and any potential unique individual exposures (such as burn pits, occupational or specific personal dosimeter data) when assessing individual concerns. At all base camps, certain individuals needed 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).

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Table 1. Population-Based Health Risk Estimates – [Jalalabad (and the associated locations), Afghanistan][1, 2]

Source of Identified Health Risk[3]	Unmitigated Health Risk Estimate[4]	Control Measures Implemented	Residual Health Risk Estimate[4]
Air			
PM_{10}	Short-term: Low. 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 bad, closing tent flaps/windows, following proper requirements for burn pit operations.	Short-term: Low. 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
Soil			
Organic Compounds	Short-term: Not an identified source of health risk.		Short-term: Not an identified source of health risk.
	Long-term: Low: Naphthalene		Long-term: Low: Naphthalene
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 and Hepatitis E). If ingesting local food/water, the health effects could have temporarily incapacitated personnel (diarrhea) or resulted in prolonged illness (Hepatitis A, Typhoid fever, Brucellosis, Hepatitis E).	Preventive measures include Hepatitis A and Typhoid fever vaccination and consumption of food and water only from approved sources.	Short-term: Low to none
	Long-term: none identified		Long-term: No data available
Arthropod Vector Borne	Short-term: Moderate (Malaria, leishmaniasis-cutaneous, Crimean-Congo hemorrhagic fever, sandfly fever and typhus-miteborne), Low (West Nile fever, and Plague).	Preventive measures include proper wear of the treated uniform and application of repellent to exposed skin and bed net, and appropriate chemoprophylaxis.	Short-term: Low
	Long-term: Low (Leishmaniasis-visceral infection)		Long-term: No data available
Water-Contact (e.g. wading, swimming)	Short-term: Moderate (Leptospirosis)		Short-term: No data available
	Long-term: None identified		Long-term: No data available
Respiratory	Short-term: Moderate Tuberculosis (TB) and Low (meningococcal meningitis).	TB was evaluated as part of the PDHA (Post Deployment Health Assessment). A TB skin test was required post-deployment if potentially exposed.	Short-term: Low
	Long-term: None identified		Long-term: No data available

Soil-contact Diseases	Short term: Moderate for soil-transmitted helminths (hookworm, strongyloidiasis, and cutaneous larva migrans).		Short term: Moderate for soil-transmitted helminths (hookworm, strongyloidiasis, and cutaneous larva migrans).
	Long term: Moderate for soil-transmitted helminths (hookworm, and strongyloidiasis).		Long term: Moderate for soil-transmitted helminths (hookworm, and strongyloidiasis).
Animal Contact	Short-term: Moderate (Rabies and Q-fever), Low (Anthrax and H5N1 avian influenza)	General Order 1B mitigated rabies risk by prohibiting contact with, adoption, or feeding of feral animals.	Short-term: No data available
	Long-term: Low (Rabies)		Long-term: No data available
Venomous Animals/Insects			
Snakes, scorpions, and spiders	Short-term: Low to High: If encountered, effects of venom varied with species from mild localized swelling (e.g. widow spider) to potentially lethal effects (e.g. Haly's Pit Viper).	Risk reduced with proper and timely treatment.	Short-term: Low to High: If encountered, effects of venom varied with species from mild localized swelling (e.g. widow spider) to potentially lethal effects (e.g. Haly's Pit Viper).
	Long-term: None identified		Long-term: None identified
Heat/Cold Stress			
Heat	Short-term: None to Low: Risk could have been greater for susceptible persons including those older than 45, of low fitness level, unacclimatized personnel, or individuals with underlying medical conditions.	Risks from heat stress may have been reduced with preventive medicine controls such as proper hydration, work-rest cycles, and mitigation.	Short-term: None to Low: Risk could have been greater for susceptible persons including those older than 45, of low fitness level, unacclimatized personnel, or individuals with underlying medical conditions.
	Long-term: Low. Risk could have been greater for susceptible persons including those older than 45, of low fitness level, unacclimatized personnel, or individuals with underlying medical conditions.		Long-term: Low. Risk could have been greater for susceptible persons including those older than 45, of low fitness level, unacclimatized personnel, or individuals with underlying medical conditions.
Cold	Short-term: Low.	Risks from cold stress may have been reduced with protective measures such as use of the buddy system in cold weather, and proper wear of protective clothing.	Short-term: Low.
	Long-term: Low.		Long-term: Low.
Unique Incidents/ Concerns			
Burn Pits	Short-term: Low: Acute (short-term) symptoms (such as eye, nose, throat, and lung irritation) from short-term exposure to smoke may have occurred, more pronounced during peak days. More serious effects were possible in susceptible persons (e.g., those with asthma/existing respiratory diseases).	Control measures included locating burn pits downwind of prevailing winds, increased distance from working and living areas when possible, and improved waste management	Short-term: Low: Acute (short-term) symptoms (such as eye, nose, throat, and lung irritation) from short-term exposure to smoke may have occurred, more pronounced during peak days. More serious effects are possible in susceptible persons (e.g., those with asthma/existing respiratory diseases).

	Long-term: Low. Little or no health impacts at the population level have been identified by DOD as of the date of publication of this summary.	techniques	Long-term: Low. Little or no health impacts at the population level have been identified by DOD as of the date of publication of this summary.

[1] This Summary Table provides a qualitative estimate of population-based short- and long-term health risk s associated with the general ambient and occupational environment conditions at Jalalabad and the associated locations. It does not represent a unique individual exposure profile. Actual individual exposures and health effects depended 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 have resulted in a significant individual exposure. Any such person seeking medical care should have their specific exposure documented in an SF600.

[2] This assessment was based on specific data and reports obtained from the November 23, 2003 through February 15, 2011 timeframe. It was considered a current representation of general site conditions but may not reflect certain fluctuations or unique exposure incidents. Acute health risk estimates were generally consistent with field-observed health effects.

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

[4] Health risks in this Summary Table were 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 have provided 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 made use of all historic site data while previous reports may have only been based on a select few samples.

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1 Discussion of Health Risks at Jalalabad (and the associated locations) by Source

The major source categories of potential health risk evaluated at Jalalabad (and the associated locations) are described below. The evaluation process included identifying what, if any, specific sub-categories/health concerns were present. This initial step resulted in "screening out" certain sub-categories that posed no identifiable health risk (for example if all data were below screening levels). While this section discusses sub-categories that have been determined to present no identifiable health risk, the Summary Table only contains those sub-categories that were determined to pose some level of potential health risk.

2 Air

2.1 Site-Specific Sources Identified

Personnel deployed to Jalalabad (and the associated locations) were exposed to various airborne contaminants. Windblown dust and sand contributed to particulate matter (PM) exposures at Jalalabad (and the associated locations). The major contributors to air contamination were the use of burn pits to dispose of municipal solid wastes, incinerators and burn boxes/barrels, activities associated with the operation of the airfield hub, emissions from diesel fuel powered generators, fuel storage, vehicular traffic, and airborne dust resulting from high winds or dust storms.

Environmental health surveillance for particulate matter less than 10 micrometers in aerodynamic diameter (PM_{10}) occurred in 2005, 2006, 2007, and 2010. No samples were available in 2003, 2004, 2008, 2009, or 2011 for characterization. Environmental health surveillance for particulate matter less than 2.5 micrometers in aerodynamic diameter ($PM_{2.5}$) occurred in 2010. All other years (2003 through 2009 and 2011) had no samples with which to characterize those particular years. The summary of these results follows.

2.2 PM_{10}.

2.2.1 Sample data/Notes:

Exposure Guidelines (in $\mu g/m^3$):
Short-term (24-hour) PM_{10}: Negligible MEG=250, Marginal MEG=420, Critical MEG=600.
Long-term (1-year) PM_{10} MEG: Not Available.

The range of 24-hour PM_{10} concentrations in 75 samples that were collected from June 2005 to July 2010 was 25 to 407 $\mu g/m^3$. The average was 166 $\mu g/m^3$.

2.2.2 Short-term health risk:

Low. Short-term risk was based on comparison of daily concentrations to 24-hour MEGs. Risk from peak and typical exposures was Low in 2007. All other years had insufficient samples and data available with which to determine risk. Daily PM_{10} levels exceeded no Negligible, Marginal or Critical MEG indicating concentrations were not a hazard on 85.5 percent of the days sampled. Daily PM_{10} levels exceeded a Negligible, Marginal or Critical MEG resulting in Low risk on 14.5 percent of the days sampled. Respiratory effects could increasingly impact real-time health and mission capabilities as they exceed higher levels of MEGs. Acute effects to relatively healthy troops were mostly eye, nose, and throat irritation, and respiratory effects (sneezing, adaptive responses such as coughing, sinus congestion and drainage) that could be exacerbated by increased activity. These effects were

consistent with those generally reported from the field. Confidence in the risk estimate was medium.

2.2.3 Long-term health risk:

Not Evaluated-no available health guidelines. The U.S. Environmental Protection Agency (EPA) retracted its long-term standard National Ambient Air Quality Standard (NAAQS) for PM_{10} due to an inability to clearly link chronic health effects with chronic PM_{10} exposure levels.

2.3 $PM_{2.5}$

2.3.1 Sample data/Notes:

Exposure Guidelines:

Short-term (24-hour) $PM_{2.5}$ MEGs (µg/m^3): Negligible MEG=65, Marginal MEG=250, Critical MEG=500.

Long-term (1-year) $PM_{2.5}$ MEGs: Negligible MEG=15, Marginal MEG=65.

The range of 24-hour $PM_{2.5}$ concentrations in two samples that were collected in October 2010 was 59 to 162 µg/m^3. The average was 115 µg/m^3.

2.3.2 Short-term and Long-term health risk:

Not enough data were available to support a short-term or long-term health risk assessment.

2.4 Metals

2.4.1 Sample data/Notes:

Degree of risk was estimated based on comparison of metals results from PM_{10} air samples to specified MEGs. Seventy-five samples were collected from 2005 through 2010. At least one sample contained detectable chromium, manganese, nickel, or zinc. However, all of the detected metals were found at concentrations below their short term and long term MEGs.

2.4.2 Short-term and Long-term health risk:

None identified based on available sampling data. All detected contaminants were below applicable 1-year negligible MEGs**.**

2.5 Chemical Pollutants (gases and vapors)

2.5.1 Sample data/Notes:

No chemical pollutant air sampling data were available for Jalalabad (and the associated locations) in the Defense Occupational and Environmental Health Readiness System (DOEHRS).

2.5.2 Short and long-term health risks:

No data were available to support a short-term or long-term health risk assessment.

3 Soil

3.1 Sample data/Notes:

Analytical data for soil samples collected at Jalalabad, JAF, FOB Fenty, and Camp Gamberi during 2006, 2007, 2008, 2009, and 2010 were available for the following classes of parameters: heavy metals, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polyaromatic hydrocarbons (PAHs), pesticides, herbicides and radionuclides. There was one soil sample for Jalalabad taken in 2008 and one soil sample for Camp Gamberi in 2010. There were twenty-three soil samples collected from JAF and FOB Fenty in 2006, 2007, 2008, 2009, and 2010. These samples were analyzed together because JAF and FOB Fenty are collocated.

3.2 Short-term health risks:

Currently, sampling data for soil are not evaluated to determine short-term risk.

3.3 Long-term health risks:

Variable (None to Low). Long-term risk was based on the comparison of yearly average concentrations to 1-year MEGs. Naphthalene was above its 1 year negligible MEG and found to have low risk in 2007. Naphthalene was not a hazard for any other year with samples. No other chemicals were identified as hazards from samples collected in other years. There were not enough data available to support a short-term or long-term health risk assessment for Jalalabad or Camp Gamberi, however all parameters that were sampled in these locations were below their corresponding 1-year negligible MEG values.

4 Water

In order to assess the risk to U.S. personnel from exposure to water in theater, US Army Public Health Command (USAPHC) identified the most probable exposure pathways based on available information. At this time, the exposure pathways were defined as ingestion of drinking water and the use of water for non-drinking purposes (such as personal hygiene, food preparation, or incidental ingestion). A conservative (protective) assumption is that all personnel ingested 5-15 liters of water per day for up to 365 days. Non-drinking water exposures were characterized by ingestion of much less than 5-15 liters of water per day (assumed range of military ingestion rates). Analytical data for all drinking and nondrinking water samples were assessed for the following groups: metals, SVOCs, VOCs, PAHs, polychlorinated biphenyls (PCBs), herbicides, and ions. Note that gross alpha and gross beta radiological results were not included in the health risks.

4.1 Drinking Water.

This assessment included three drinking water samples collected from bottled water at JAF. Contaminants detected in the samples did not exceed their applicable short-term and long-term Negligible MEGs.

4.1.1 Short-term and long-term health risk:

None identified based on available sampling data. All detected contaminants were below applicable short-term and long-term negligible MEGs**.**

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

This type of exposure included water that was used for non-drinking applications such as water used for personal hygiene, laundry, cooking and showering. This assessment included non-drinking water samples collected from a well at JAF (one sample), from

Reverse Osmosis Water Purification Units (ROWPUs) and municipal sources at FOB Fenty (four samples), from a ROWPU at Camp Duffman (one sample), from a well at Camp Hughie (one sample), and from treated disinfected storage tanks at Camp Gamberi (two samples). Contaminants detected in the samples did not exceed their applicable short-term and long-term Negligible MEGs.

4.2.1 Short-term and long-term health risk:

None identified based on available sampling data. All detected contaminants were below applicable short-term and long-term negligible MEGs**.**

5 Military Unique

5.1 Chemical, Biological, Radiological, Nuclear (CBRN) Weapons:

No specific hazard sources were documented in the DOEHRS or the Military Environmental Surveillance Library (MESL) from 23 November 2003 through 15 February 2011.

5.2 Depleted Uranium (DU):

No specific hazard sources were documented in the DOEHRS or MESL from 23 November 2003 through 15 February 2011.

5.3 Ionizing Radiation:

No specific hazard sources were documented in the DOEHRS or MESL from 23 November 2003 through 15 February 2011.

5.4 Non-Ionizing Radiation:

No specific hazard sources were documented in the DOEHRS or MESL from 23 November 2003 through 15 February 2011.

6 Endemic Disease[1]

This document lists the endemic disease reported in the region, its specific risks and severity and general health information about the disease.

6.1 Foodborne and Waterborne Diseases

Food borne and waterborne diseases in the area were transmitted through the consumption of local food and water. Sanitation was extremely poor throughout the country, including major urban areas. Local 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. Diarrheal diseases could be expected to temporarily incapacitate a very high percentage of personnel within days if local food, water, or ice is consumed. In addition, although not specifically assessed in this document, viral gastroenteritis (e.g., norovirus) and food poisoning (e.g., *Bacillus cereus*, *Clostridium*

[1] NOTE: “Risk” level refers to both severity of disease (without controls, for example vaccinations) and probability of disease based on local rates/endemic status. Diseases described are those presenting greater risk when compared with U.S. conditions. Most identified disease risks can and were mitigated with military preventive medicine measures/policies.

perfringens, and *Staphylococcus*) may have caused significant outbreaks. Key disease risks are summarized below:

6.1.1 Diarrheal diseases (bacteriological)

Diarrheal diseases could be expected to temporarily incapacitate a very high percentage of personnel (potentially over 50 percent 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 these resulted in 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 have required greater than 72 hours limited duty, or hospitalization.

6.1.2 Hepatitis A, typhoid fever, and diarrhea-protozoal

Hepatitis A, typhoid fever, and diarrhea-protozoa could cause prolonged illness. Hepatitis A and typhoid fever could cause prolonged illness in a small percentage of personnel, (less than 1 percent per month) and had a high risk estimate if no preventive medicine measures were taken. However, because all deployed U.S. Forces, including civilians and contractors, were supposed to be vaccinated for Hepatitis A and Typhoid fever, no risk was identified for U.S. Forces from Hepatitis A and Typhoid fever. Diarrhea-cholera and diarrhea-protozoal had a moderate risk estimate if no preventive medicine measures were taken although cases for all are rare. Though much rarer, other potential diseases in this area with a moderate risk estimate included; Hepatitis E, diarrhea-cholera, and brucellosis.

6.1.3 Short-term and Long-term Health Risks:

Short-term health risks: The overall unmitigated short-term risk associated with foodborne and waterborne diseases at Jalalabad (and the associated locations) was considered High (for bacterial diarrhea, hepatitis A, typhoid fever) to Moderate (for diarrhea-cholera, diarrhea-protozoal, brucellosis, hepatitis E) if local food or water was consumed. Preventive medicine measures such as vaccinations reduced the risk estimate to none (for Hepatitis A and Typhoid fever). Additionally, U.S. Forces were provided food and water from approved sources. Confidence in risk estimate was medium.

Long-term health risks: None identified based on available data. Confidence in risk estimate was medium.

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 risk in Afghanistan, was capable of debilitating a high percentage of personnel for up to a week or more in the absence of risk mitigation measures. In addition, other vector-borne diseases were transmitted at low or unknown levels and may have constituted a significant risk.

6.2.1 Malaria

Malaria incidents were often determined based on the presence of agriculture activity, including irrigation systems, which provided breeding habitats for vectors. In the Jalalabad (and the associated locations) region small number of cases (less than 1 percent per month attack rate) could have occurred among personnel exposed to mosquito bites. Malaria incidents could 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, and fatalities could have occurred. For U.S. personnel, risk mitigation included proper compliance with malaria chemoprophylaxis requirements, proper wear of treated uniforms, application of repellent to exposed skin, and use of bed nets (when applicable).

6.2.2 Leishmaniasis

Leishmaniasis was transmitted by sand flies. The disease risk was highest when sand flies were most prevalent in March through November. There were two forms of the disease– cutaneous (acute form) and visceral (a more latent form of the disease). The leishmaniasis parasites may have survived for years in infected individuals and this infection may have gone unrecognized by physicians in the U.S. when infections became symptomatic years later. However, in the Jalalabad (and the associated locations) region there were only a small number of cases (less than 1 percent per month attack rate). Cutaneous infection was unlikely to be debilitating, though lesions could be disfiguring. Visceral leishmaniasis caused a severe febrile illness which typically required hospitalization with convalescence over 7 days. For U.S. personnel, risk mitigation included proper wear of treated uniforms, application of repellent to exposed skin, and minimizing outdoor activities (when possible) between dusk and dawn.

6.2.3 Crimean-Congo hemorrhagic fever

Crimean-Congo hemorrhagic fever most commonly occurred in rare cases (less than 0.1 percent per month attack rate) and was transmitted by tick bites or occupational contact with blood or secretions from infected animals. It was a very severe illness typically requiring intensive care with fatality rates from five to fifty percent. The risk was moderate but cases were rare. For U.S. personnel, risk mitigation included proper wear of treated uniforms and application of repellent to exposed skin.

6.2.4 Sandfly fever

Sandfly fever had a moderate risk although it was estimated that potential disease rates were from 1 percent to 10 percent of personnel could be affected per month under worst case conditions. It was transmitted by sandflies and occurred more commonly in children though adults were still at risk. Incidents could result in debilitating febrile illness typically requiring 1-7 days of supportive care followed by return to duty.

6.2.5 Plague

Plague was present in rare cases and typically occurred in more urban areas. It was reservoired by rats and transmitted by their flea populations; this disease was associated with a low risk estimate. Incidents could result in potentially severe illness which may have required more than 7 days of hospitalization and convalescence.

6.2.6 Typhus-miteborne

Typhus-miteborne had a moderate risk estimate although it was estimated that potential disease rates were from 1 percent to 10 percent of personnel could be affected per month under worst case conditions. The disease was transmitted by the larval stage of trombiculid mites (chiggers), which were typically found in areas of grassy or scrubby vegetation. Debilitating febrile illness typically required 1 to 7 days of inpatient care, followed by return to duty.

6.2.7 West Nile fever

West Nile fever was present and was maintained by the bird population and mosquitoes that help to transfer the diseases from birds to humans. The majority of infections in young,

healthy adults were asymptomatic although it could result in fever, headache, tiredness, and body aches, occasionally with a skin rash (on the trunk of the body) and swollen lymph glands. This disease was associated with a low risk estimate.

6.2.8 Overall Risk Levels

Unmitigated Short-term health risks: 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). Confidence in risk estimate was medium.

Long-term health risks: Moderate (for leishmaniasis-visceral [chronic]). Confidence in risk estimate was medium.

6.3 Water Contact Diseases

Areas along rivers and lakes were the primary risk areas for water contact diseases and the risk period was seasonal, typically April through November. Any tactical operations or recreational activities that involved extensive contact with surface water (lakes, streams, rivers, or flooded fields) may have caused significant exposure to leptospirosis.

6.3.1 Leptospirosis

Leptospirosis was present in Afghanistan but at unknown levels. Human infection occurs 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 facilitated the spread of the organism because as water saturated the environment, leptospirosis present in the soil passed directly into surface waters. Leptospirosis could have entered the body through cut or abraded skin, mucous membranes, and conjunctivae. Ingestion of contaminated water could also lead to infection. The acute generalized illness associated with infection could 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.

6.3.2 Overall Risk Levels

Short-term health risks: Medium for leptospirosis because Jalalabad (and the associated locations) was located at the junction of the Kabul and Kunar rivers, which were potential sources of leptospirosis). Confidence in risk estimate was medium.

Long-term health risks: None identified based on available data. Confidence in risk estimate was medium.

6.4 Respiratory Diseases

6.4.1 Tuberculosis (TB)

Tuberculosis (TB) posed a moderate year round risk to U.S. personnel in Afghanistan. Tuberculosis was usually transmitted through close and prolonged exposure to an active case of pulmonary or laryngeal tuberculosis, but could have also occurred with incidental contact. The Army Surgeon General had 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.

6.4.2 Meningococcal meningitis

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.

6.4.3 Short-term and Long-term health risks:

Short-term health risks: Moderate (for tuberculosis) to Low (for meningococcal meningitis). Confidence in risk estimate was medium.

Long-term health risks: None identified. TB was evaluated as part of the Post Deployment Health Assessment (PDHA). A TB skin test was required post-deployment if potentially exposed, where it was treated.

6.5 Animal-Contact Diseases

6.5.1 Rabies

Rabies posed a year-round moderate risk. Occurrence was well above U.S. levels due to the lack of organized control programs. Dogs were the primary sources of human exposure to rabies in Afghanistan, and canine rabies was the most common rabies strain. Rabies was 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. The time between exposure and the onset of symptoms—the incubation period—varied but averages two to twelve weeks in humans. In rare cases, symptoms may not have appeared for over one year.

6.5.2 Anthrax

Anthrax posed a year-round moderate risk, but cases were rare. Anthrax was a naturally occurring infection; cutaneous anthrax was transmitted by direct contact with infected animals or carcasses, including hides. Eating undercooked infected meat could have resulted in contracting Gastrointestinal Anthrax. Pulmonary Anthrax was contracted through inhalation of spores and was extremely rare.

6.5.3 Q-Fever

Q-Fever posed a year-round moderate risk. Rare cases were possible among personnel exposed to direct contact with infected livestock and domesticated animals or contaminated manure straw or dust in areas where herd animals were sheltered and grazed. Significant outbreaks (affecting 1-50 percent) could have occurred in personnel with heavy exposure to barnyards or other areas where animals were 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.

6.5.4 H5N1 avian influenza

H5N1 avian influenza posed a year-round negligible risk. No illnesses were reported in U.S. personnel, however those who had close contact with birds or poultry had an increased risk of H5N1 infection.

6.5.5 Overall Risk Levels

Short-term health risks: Moderate (for rabies, anthrax, Q-fever) to Low (for H5N1 avian influenza) short-term risk due to rare occurrence. Confidence in risk estimate was medium.

Long-term health risks: None identified based on available data. Confidence in risk estimate was medium.

7 Venomous Animal/Insect

No specific hazard sources for Jalalabad (and the associated locations) were documented in the DOEHRS or MESL. A number of medically relevant venomous species had home ranges that overlapped the location of Jalalabad (and the associated locations) and may have presented a health risk when encountered by personnel.

7.1 Scorpions

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

Compsobuthus tofti, Orthochirus afghanus, Orthochirus jalalabadensis, Orthochirus samrchelsis: Unknown; there were a number of dangerous Buthid scorpions, but also others known to cause minimal effects only. Without clinical data it was unclear where this species fitted within that spectrum.

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

7.2 Snakes

Gloydius halys: Severe envenoming possible, potentially lethal. Bites may have caused moderate to severe coagulopathy.

Naja oxiana: Severe envenoming possible, potentially lethal. Bites may have caused systemic effects, principally flaccid paralysis.

Macrovipera lebetina (subspecies**:** *obtuse* and *turanica*): Severe envenoming possible, potentially lethal. Bites may have caused mild to severe local effects, shock & coagulopathy.

Platyceps rhodorachis: Mild envenoming only, not likely to prove lethal. Required symptomatic treatment only.

Hemorrhois ravergieri, Psammophis leithii, and *Psammophis lineolatus*: Unlikely to cause significant envenoming. Bites required symptomatic treatment only.

Boiga trigonata and *Telescopus rhinoporna:* Unlikely to cause significant envenoming. Likely to cause minimal to moderate local effects and no systemic effects.

7.3 Overall Risk Levels

Short-term health risks: Variable (Low to High): If encountered, effects of venom varied with species from mild localized effects (e.g. *Platyceps rhodorachis*) to potentially lethal effects (e.g. *Echis multisquamatus*). See effects of venom above. Risk could have been reduced with proper and timely treatment. Confidence in risk estimate was medium.

Long-term health risk: None identified. Confidence in risk estimate was medium.

8 Heat/Cold Stress

Jalalabad (and the associated locations) is located 1,814 feet above sea level in the province of Nangarhar. Temperatures in Nangarhar Province ranged from 37.2 degrees Fahrenheit to 102.7 degrees Fahrenheit.

8.1 Heat

Normal daily high temperatures in Nangarhar Province where Jalalabad (and the associated locations) is located were 102.7 degrees Fahrenheit.

Short-term health risks: The short-term risk of heat injury was Low in unacclimated personnel. 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 health implications from heat injuries were rare but could have occurred, especially from more serious injuries such as heat stroke. Risk was reduced further through preventive measures such as work-rest cycles, appropriate hydration, heat stress signs/symptoms education, uniform modification, application of sunscreen protection, and minimizing of heavy work during peak temperature hours, when appropriate. It was possible that high heat in conjunction with various chemical exposures could have increased long-term health risks, though specific scientific evidence was not conclusive.

Long-term health risks: The long-term risk was Low. Long-term health implications from heat injuries were rare but could have occurred–especially from more serious heat injuries such as heat stroke. 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. Confidence in these risk estimates was medium.

8.2 Cold

Normal daily low temperatures in Nangarhar province where Jalalabad (and the associated locations) is located were 37.2 degrees Fahrenheit.

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

9 Noise

9.1 Continuous:

No continuous noise evaluations were conducted so continuous noise was not evaluated for this POEMS.

Short-term and Long-term risks: Not Evaluated-no available continuous noise evaluation. No identified health risks.

9.2 Impulse:

No impulse noise evaluations were conducted so impulse noise was not evaluated for this POEMS.

Short-term and Long-term risks: Not Evaluated-no available impulse noise evaluation. No identified health risks.

10 Unique Incidents/Concerns

10.1 Fuel/petroleum products/industrial chemical spills

No specific information was available to assess this hazard.

Short-term and Long-term risks: Unknown.

10.2 Waste Sites/Waste Disposal:

Garbage collected throughout JAF was disposed of in a burn pit and the burn pit was able to handle the amount of garbage produced by the airfield. The burn pit at JAF was located within 100 meters of troop housing area at JAF. Garbage collected at FOB Finley-Shields was disposed of in a burn pit, which was located 500 meters away from troop housing. The burn pit located on FOB Fenty was in use until 2011. By 2011 the burn pit at FOB Fenty was inactivated and the medical and solid waste incinerators were operational. In 2009 no burn pits were in use at Camp Dwyer and FOB Hughie but the sites did have burn barrels for the burning of sensitive documents. In 2011 it was reported that Camp Gambieri had no burn pits and had two solid waste incinerators and a medical waste incinerator that were not operational. In 2011, contracted local nationals took solid waste generated at Camp Gambieri off-site for disposal.

Short-term and Long-term risks: Unknown. Only sparse qualitative data on waste sites and waste disposal were available. Therefore, there were insufficient data with which to assess risk levels.

10.3 Asbestos:

No specific information was available to assess this hazard.

Short-term and Long-term risks: Unknown.

10.4 Lead Based Paint:

No specific information was available to assess this hazard.

Short-term and Long-term risks: Unknown.

10.5 Pesticides/Pest Control:

No specific information was available to assess this hazard.

Short-term and Long-term risks: Unknown.

10.6 Burn Pits:

As described in section 10.2, open burning operations were conducted at the named basecamps. The open burning operations ceased in accordance with DoD and USCENTCOM guidance.

Short-term and Long-term risks: Low.
While not specific to Jalalabad (and the associated locations), the consolidated epidemiological and environmental sampling studies on burn pits that have been conducted to date to address health risk generally showed little or no health impact at the population level, several years post-deployment on the long-term health of personnel assigned to a burn pit location. The DoD recognized that acute symptoms due to smoke exposure may have occurred, including reddened eyes, irritated respiratory passages, and cough that may

have persisted for some time. While no long-term health risks were yet identified at a population-level, it was plausible that a smaller number of Service Members may have been affected by longer-term health effects, possibly due to combined exposures (such as sand/dust, industrial pollutants, tobacco, smoke and other agents) and individual susceptibilities such as preexisting health conditions or genetic factors.

11 References[2]

1. Casarett and Doull's Toxicology: the Basic Science of Poisons, Chapter 2- Principles of Toxicology; Fifth Edition, McGraw Hill, New York.
2. 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.
3. DoDI 6055.05, Occupational and Environmental Health, 2008.
4. 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.
5. JCSM (MCM) 0028-07, Procedures for Deployment Health Surveillance, 2007.
6. USA PHC TG230, June 2010 Revision.
7. USACHPPM 2008 Particulate Matter Factsheet; 64-009-0708, 2008.

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).
U.S. Army Public Health Command (USAPHC) Phone: (800) 222-9698. http://phc.amedd.army.mil/Pages/default.aspx

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

Navy and Marine Corps Public Health Center (NMCPHC) (formerly NEHC) Phone: (757) 953-0700. http://www-nehc.med.navy.mil
U.S. Air Force School of Aerospace Medicine (USAFSAM) (formerly AFIOH) Phone: (888) 232-3764. http://www.wpafb.af.mil/afrl/711hpw/usafsam.asp
DoD Force Health Protection and Readiness (FHP & R) Phone: (800) 497-6261. http://fhp.osd.mil