

Military Deployment
Periodic Occupational and Environmental Monitoring Summary (POEMS):
Camp Bastion (including Bastion 1, Bastion 2, Camp Leatherneck, Camp Tombstone,
Camp Barber, Camp Viking), Afghanistan; CY: 2006 to 2009

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 DoD assessment of Occupational and Environmental Health (OEH) risk for Camp Bastion, 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 September 2006 through December 2009 to include deployment OEH Surveillance (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 Bastion 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 September 2006 through December 2009.

The POEMS can be useful to inform healthcare providers and others of environmental conditions experienced by individuals deployed to Camp Bastion 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 DESCRIPTIONS: Camp Bastion is the main British outpost in Afghanistan and is located in the center of the Helmand province. The camp housed roughly 4,000 British Forces personnel and 1,000 U.S. Forces. Camp Bastion was established in April 2006 and is located in a remote desert area far from population centers. The base is divided into two main parts, Bastion 1 and Bastion 2, and is adjoined to Camp Leatherneck (formerly Camp Tombstone) and the Afghan National Army Camp Shorabak. Bastion 2 includes two tenant camps, Camp Barber and Camp Viking. This POEMS includes risks and medical implications applicable to Camps Bastion, Leatherneck, Tombstone, Barber, and Viking for the years presented. The camp contains an airfield, hangars, temporary portable aircraft arrestor equipment, oxygen and nitrogen production plants, an environmental conditioning, design, installation, and maintenance facility, a field hospital that has facilities for the seriously ill and injured, intensive care, high-dependency patients, surgery, physiotherapy, and dental, mental health, x-ray and laboratory provisions.

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 Bastion. As indicated in the detailed sections that follow Table 2, controls established to reduce health risk were factored into this assessment. In some cases, e.g. ambient air, specific controls are noted, but not routinely available/feasible.

Table 1: Summary of Occupational and Environmental Conditions with MODERATE or Greater Health Risk

Short-term health risks & medical implications:

The following may have caused acute health effects in some personnel *during deployment at Camp Bastion*:

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, Tuberculosis (TB), Rabies, Anthrax, Q fever), heat stress, and burn pits. For food/waterborne diseases (e.g., bacterial diarrhea, hepatitis A, Typhoid fever, Brucellosis, diarrhea-cholera, diarrhea-protozoal, Hepatitis E), if ingesting food and water off post, the health effects can temporarily incapacitate personnel (diarrhea) or result in prolonged illness (Hepatitis A, Typhoid fever, Hepatitis E, and Brucellosis). For heat stress, risk can be greater for susceptible persons including those older than 45, of low fitness level, unacclimatized personnel, or individuals with underlying medical conditions. Risks from food/waterborne diseases and heat stress 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. 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 those who had interactions off post. For exposure to burn pits and particulate matter (PM₁₀), 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, and 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 burn pits and 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 Bastion. Personnel who reported with symptoms or required treatment while at this site should have exposure/treatment noted in medical record on a Standard Form (SF) 600 (*Chronological Record of Medical Care*).

Long-term health risks & medical implications:

The hazards associated with potential long-term health effects at Camp Bastion include inhalable fine particulate matter less than 2.5 micrometers in diameter (PM_{2.5}), and Leishmaniasis-visceral (chronic) infection, a more latent form of the disease. Visceral leishmaniasis causes severe febrile illness typically requiring hospitalization with convalescence over 7 days. Leishmaniasis parasites may survive for years in infected individuals, and this infection may go unrecognized until infections become symptomatic years later. It is considered possible that some otherwise healthy personnel who were exposed for a long-term period to PM_{2.5} levels 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_{2.5} 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 burn pits, or occupational or specific personal dosimeter data) when assessing individual concerns. Certain individuals may need to be followed/evaluated for specific occupational exposures/injuries (e.g., annual audiograms as part of the medical surveillance for those enrolled in the Hearing Conservation Program; and personnel covered by Respiratory Protection Program and/or Hazardous Waste/Emergency Responders Medical Surveillance).

Table 2. Population-Based Health Risk Estimates – Camp Bastion, Afghanistan^{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 microns in diameter (PM ₁₀)	Short-Term Health Risk. Variable (None to Low): Daily levels vary, acute health effects (e.g., upper respiratory tract irritation) are 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: 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 Health Risk. Not evaluated-no available health guidelines.		Long-term: No health guidelines
Particulate matter less than 2.5 microns in diameter (PM _{2.5})	Short-term: Variable (None to Low): Majority of the time no anticipated acute health effects from PM _{2.5} ; certain peak levels may produce effects as described for PM ₁₀ .	Limiting strenuous physical activities when air quality is especially poor; and actions such as closing tent flaps, windows, and doors.	Short-term: Low, A majority of the time mild acute (short term) health effects are anticipated; certain peak levels may produce mild eye, nose, or throat irritation in some personnel and pre-existing health conditions (e.g., asthma, or cardiopulmonary diseases) may be exacerbated.
	Long-term: Moderate: Small percentage of persons may be at increased risk for developing chronic conditions (particularly those more susceptible to acute effects (e.g., those with asthma/existing respiratory diseases)).		Long-term: Low. A small percentage of personnel may be at increased risk for developing chronic conditions. Particularly those more susceptible to acute effects (e.g., those with asthma/existing respiratory diseases).
ENDEMIC DISEASE			
Food borne/Waterborne (e.g., diarrhea-bacteriological)	Variable (Low to High): High (bacterial diarrhea, Hepatitis A, Typhoid fever) to Moderate (diarrhea-cholera, diarrhea-protozoal, brucellosis, hepatitis E). If ingesting unapproved local food/water, the health effects can temporarily incapacitate personnel (diarrhea) or result in prolonged illness (Hepatitis A, Typhoid fever, Brucellosis, Hepatitis E). Risk reduced to Low with preventive medicine measures, which include Hepatitis A and Typhoid fever vaccination, and consumption of food and water only from approved sources.	Preventive measures include Hepatitis A and Typhoid fever vaccination and consumption of food and water only from approved sources.	Short-term: Low to none
	No diseases were identified as posing a long-term health risk.		Long-term: No data available
Arthropod Vector Borne	High: Malaria Moderate: Leishmaniasis-cutaneous, Crimean-Congo hemorrhagic fever, Typhus-miteborne, and sandfly fever. Low: the Plague, and West Nile fever. Risk from all arthropod vector borne diseases is reduced to low by proper wear of treated uniform, application of repellent to exposed skin, and	Preventive measures include proper wear of treated uniform, application of repellent to exposed skin, and bed net use, minimizing areas of standing water and appropriate chemoprophylaxis.	Short-term: Low

Source of Identified Health Risk ³	Unmitigated Health Risk Estimate ⁴	Control Measures Implemented	Residual Health Risk Estimate ⁴
	appropriate chemoprophylaxis.		
	Moderate: Leishmaniasis-visceral infection.		Long-term: No data available
Water-Contact (e.g. wading, swimming)	Low: Leptospirosis.	Recreational swimming in surface waters not likely in this area of Afghanistan during this time period.	Low: Leptospirosis.
	No diseases were identified as posing a long-term health risk.		No diseases were identified as posing a long-term health risk.
Respiratory	Moderate: Tuberculosis (TB) Low: meningococcal meningitis.	Providing adequate living and work space; medical screening; vaccination	Short-term: Low
	None identified. TB is evaluated as part of the PDHA (Post Deployment Health Assessment). A TB skin test is required post-deployment if potentially exposed.		Long-term: No data available
Animal Contact	Moderate: Rabies, Anthrax, Q-fever Low: H5N1 avian influenza	Prohibiting contact with, adoption, or feeding of feral animals IAW CENTCOM GO 1B. Risks are further reduced in the event of assessed contact by prompt post-exposure rabies prophylaxis IAW The CDC's ACIP guidance.	Short-term: No data available
	No diseases were identified as posing a long-term health risk.		Long-term: No data available
VENOMOUS ANIMAL/ INSECTS			
Snakes, scorpions, and spiders	Short-term: Low; If encountered, effects of venom vary with species from mild localized swelling to potentially lethal effects.	Risk reduced by avoiding contact, proper wear of uniform (especially footwear), and proper and timely treatment.	Short-term: Low; If encountered, effects of venom vary with species from mild localized swelling to potentially lethal effects.
	Long-term: No data available		Long-term: No data available
HEAT/COLD STRESS			
Heat	Short-term: Variable Extremely High to Low; Risk of heat injury is extremely high from May to September, high in October, moderate from March to April, and low from November to February.	Work-rest cycles, proper hydration and nutrition, and wet bulb globe temperature (WBGT) monitoring.	Short-term: Variable Mitigated to Low; Risk of heat injury is extremely high from May to September, high in October, moderate from March to April, and low from November to February.
	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	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.

Source of Identified Health Risk ³	Unmitigated Health Risk Estimate ⁴	Control Measures Implemented	Residual Health Risk Estimate ⁴
		clothing.	
Unique Incidents/Concerns			
Pesticides/Pest Control	Short-term: Low	See Section 10.5	Short-term: Low
	Long-term: Low		Long-term: Low
Burn Pits	Camp Bastion and Camp Leatherneck had burn pits and incinerators used on a small scale for medical waste. No data was available to evaluate short and long-term health risk. Short-term health effects could include eye, nose, throat, and lung irritation. More serious effects are possible in susceptible persons (e.g., those with asthma/existing respiratory diseases).	Control measures may have included locating burn pits downwind of prevailing winds, increased distance from living and working areas when possible, and improved waste segregation and management techniques.	Short-term: Insufficient data to assess risk.
			Long-term: Insufficient data to assess risk.

¹This Summary Table provides a qualitative estimate of population-based short- and long-term health risks associated with the occupational environment conditions at Camp Bastion. 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 28 May 2010 through 16 January 2013. Sampling locations are assumed to be representative of exposure points for the camp population but may not reflect all the fluctuations in environmental quality or capture unique exposure incidents.

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 Bastion. The health risks are presented as Low, Moderate, High or Extremely High for both acute and chronic health effects. The health risk level is based on an assessment of both the potential severity of the health effects that could be caused and probability of the exposure that would produce such health effects. Details can be obtained from the APHC/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 Bastion by Source

The major source categories of potential health risk evaluated at Camp Bastion are described below. The evaluation process includes identifying what, if any, specific sub-categories/health concerns are present. This initial step results in “screening out” certain sub-categories that pose no identifiable health risk (for example if all data is below screening levels). While this discusses sub-categories that have been determined to present no identifiable health risk, the Summary Table on the previous page 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 Camp Bastion are exposed to various airborne contaminants. Windblown dust and sand contribute to particulate matter (PM) exposures above health-based MEGs at Camp Bastion. While the camps are located away from local population areas there are a number of coalition-based operations located on and around Camp Bastion that may contribute ambient air contaminants: primarily the operation of an airfield (including hangars, temporary portable aircraft arrestor equipment); oxygen and nitrogen production plants; an environmental conditioning, design, installation, and maintenance facility; and a field hospital. An additional source of ambient air contaminants comes from the British Army’s use of open burn pits to dispose of solid waste/refuse and the Army’s use of incinerators near the fenceline with Camp Leatherneck. Burn pit workers, tower guards and any other personnel that work at or in close proximity of the burn pits may have a higher risk of exposure to contaminants emitted from the burn pits than the general population at Camp Bastion. This assessment used ambient air inhalation rates of a typical exertion.

Limited environmental health surveillance occurred only in 2007 and 2009 and no samples from the Enhanced Particulate Matter Surveillance Program surveys were taken at Camp Bastion. Additionally, the data set was limited to data collected by only US Forces. The summary of results follows.

2.2 Particulate Matter, less than 10 microns (PM₁₀).

2.2.1 Sample data/Notes:

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.

The range of 24-hour PM₁₀ concentrations in two samples that were collected in March 2007 was 135 to 328 µg/m³. The average was 232 µg/m³.

2.2.2 Short-term health risk:

Low. Short term risk is based on comparison of daily concentrations to the 24-hour MEGs. For the all of the days sampled (100%), PM₁₀ concentrations were below the short-term Marginal MEG indicating Low risk. Risk from peak and typical exposures was Low in 2007. All other years had no data

available. During the highest levels of PM₁₀, a few personnel may have experienced notable eye, nose, or throat irritation; most personnel would have experienced only mild eye, nose, or throat irritation effects. Pre-existing health conditions (e.g., asthma or cardiovascular diseases) may have been exacerbated. Confidence in the risk estimate is low due to limited field data.

2.2.3 Long-term health risk:

Not Evaluated-no available health guidelines. The Environmental Protection Agency (EPA) has retracted its long-term standard National Ambient Air Quality Standard (NAAQS) for PM₁₀ due to an inability to clearly link chronic health effects with chronic PM₁₀ exposure levels.

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

2.3.1 Sample data/Notes:

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.

The range of 24-hour PM_{2.5} concentrations in 25 samples that were collected in 2007 and 2009 was 8 to 256 µg/m³. The average concentration during this time was 91 µg/m³.

2.3.2 Short-term health risk:

Low. Short-term risk is based on comparison of daily concentrations to 24-hour MEGs. For the majority of the days sampled (97%), PM_{2.5} concentrations were below the short-term Marginal MEG indicating Low risk. The remaining days sampled (3%), PM_{2.5} concentrations were above the short-term Marginal MEG but below the short-term Critical MEG and indicated a Low risk. Risk from peak and typical exposures was Low in 2007 and 2009. All other years had no available data. During the highest levels of PM_{2.5}, a few personnel may have experienced notable eye, nose, or throat irritation; most personnel would have experienced only mild effects. Pre-existing health conditions (e.g., asthma or cardiovascular diseases) may have been exacerbated. Confidence in the risk estimate is low due to limited field data.

2.3.3 Long-term health risk:

Moderate. Long-term risk is based on comparison of the average sample concentration to the long-term MEGs. Unlike PM₁₀, chronic PM_{2.5} exposures are potentially associated with some long-term health consequences. The average PM_{2.5} concentration was 80 µg/m³ for samples collected in 2007 and 93 µg/m³ for samples collected in 2009. These are both above the marginal long-term MEG of 65 µg/m³. The resulting risk level was Moderate in 2007 and 2009. All other years had no available data. With repeated exposures above this level, the risk that a small percentage of susceptible personnel may develop chronic conditions (such as, reduced lung function or exacerbated chronic bronchitis, chronic obstructive pulmonary disease, asthma, atherosclerosis, or other cardiopulmonary diseases) increases. Those with a history of asthma or cardiopulmonary disease have a higher risk for developing these chronic conditions. Confidence in risk estimate is low due to limitations in field data and health effects data.

2.4 Metals

2.4.1 Sample data/Notes:

Degree of risk is estimated based on comparison of metals results from two PM₁₀ air samples to specified MEGs. Samples were collected in March 2007. None of the analyzed metals in the samples were found at concentrations above a short- or long-term MEG.

2.4.2 Short and long-term health risks:

None identified based on the available sampling data. Confidence in the risk estimate is low due to limited field data.

2.5 Volatile Organic Compounds (VOC)

2.5.1 Sample data/Notes:

No volatile organic chemical (VOC) air samples collected were collected from Camp Bastion.

2.5.2 Short and long-term health risks:

None identified based on the available sampling data.

3 Soil

3.1 Sample data/Notes:

Seven soil samples were collected at Camp Leatherneck between September 2006 and October 2009. The primary soil contamination exposure pathways are dermal contact and dust inhalation. Analytical data for these samples were assessed for the following groups: heavy metals, semi volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), pesticides, herbicides and radionuclides. If the contaminant was known or suspected, other parameters may have been analyzed for (i.e. total petroleum hydrocarbons (TPH) and polycyclic aromatic hydrocarbons (PAH) near fuel spills). For the risk assessment, personnel are assumed to remain at this location for 6 months to 1 year. No contaminants were detected in the seven samples that exceeded applicable 1-year Negligible MEGs.

3.2 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.

3.3 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 risk to US personnel from exposure to water in theater, US Army Public Health Command (Provisional) (USAPHC (Prov)) identified the most probable exposure pathways based on available information. At this time, the exposure pathways are defined as primary ingestion (bottled water) and nondrinking. Nondrinking exposures (such as from personal hygiene or food preparation) are 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, volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), herbicides, and ions.

4.1 Drinking Water.

4.1.1 Camp Bastion:

Bottled water is the only source of drinking water at Camp Bastion in 2009. Two bottled water samples were collected and analyzed at the Camp Bastion British KBR[®] Water Bottling Plant. Although this is a small sample set, risk analysis identified no hazards in these samples. No water samples representing drinking water were collected from 2006-2008. As a result, confidence in the conclusions is low due to the limited data.

4.1.2 Camp Leatherneck:

Bottled water is the only source of drinking water at Camp Leatherneck in 2009. In addition to the Camp Bastion British KBR[®] bottling plant samples, there were two samples that included bottled water brands (i.e. Kinley[®] and Nestle[®] PureLife). Both of these bottling companies were described as the primary bottled water sources for Camp Leatherneck, although several of the Bastion water bottling plant inspections mention that Camp Bastion expeditionary water packaging system (EWPS)-bottled water was being supplied to Camp Leatherneck dining facilities (DFACs). (Kinley[®] is a registered trademark of Habib Gulzar Non-Alcoholic Beverages, LTD.) (Nestle[®] is a registered trademark of Nestle Pakistan LTD, Societe des Produit.) Although this is a small sample set, risk analysis identified no hazards in these samples. No water samples representing drinking water were collected from 2006-2008. As a result, confidence in the conclusions is low due to the limited data.

4.1.3 Short-term and long-term health risk:

None identified based on the available sampling data. Confidence in the risk estimate is low due to limited field data.

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

4.2.1 Camp Bastion:

Camp Bastion wells are categorized as disinfected-fresh water, which is not filtered, but is treated with calcium hypochlorite or in-line chlorine injection systems installed at well heads prior to storage. Primary use for reverse osmosis water purification unit (ROWPU)-treated bulk or disinfected fresh well water at Camp Bastion is for personal hygiene, showering, cooking, vehicle and aircraft wash racks. There were four Camp Bastion treated water samples collected in 2009, two of which were classified as treated, unfiltered disinfected well water and the other two were from a contractor-operated ROWPU

source that was documented in the field reports as being located on Camp Leatherneck. One sample of bottled water from the Bastion Bottling Plant location that was used primarily for personal hygiene and laundry was included in the assessment. Although this is a small sample set, risk analysis identified no hazards in these samples. No water samples representing nondrinking water were collected from 2006-2008. As a result, confidence in the conclusions is low due to the limited data.

4.2.2 Camp Leatherneck:

There were 10 treated water samples for Camp Leatherneck collected in 2009. Four of these samples were categorized as disinfected fresh water samples, and six were from ROWPU sources. All of these samples were categorized as nondrinking and were from the water supplies that are used primarily for personal hygiene, showering and use at vehicle wash racks on Camp Bastion and Camp Leatherneck.

Although this is a small sample set, risk analysis identified no hazards in these samples. No water samples representing nondrinking water were collected in 2006-2008. As a result, confidence in the conclusions is low due to the limited data.

4.2.3 Camp Tombstone:

There were two ROWPU-treated water samples collected in 2007 at Camp Tombstone. Both of these samples were taken at a contractor-operated ROWPU and were both classified as nondrinking water samples. Although this is a small sample set, risk analysis identified no hazards in these samples. No water samples representing nondrinking water were collected in 2006 and 2008-2009. As a result, confidence in the conclusions is low due to the limited data.

4.2.4 Short-term and long-term health risk:

None identified based on the available sampling data. Confidence in the risk estimate is low due to limited field data.

5 Military Unique

5.1 Chemical Biological, Radiological Nuclear (CBRN) Weapons:

No specific hazard sources were documented in the DoD Deployment Occupational and Environmental Health Surveillance (OEHS) data Portal.

5.2 Depleted Uranium (DU):

No specific hazard sources were documented in DoD OEHS Portal.

5.3 Ionizing Radiation:

A search of the DoD OEHS Portal database indicated that ionizing radiation hazard sources were not present at Camp Bastion.

Short-term and Long-term risks: None identified based on the available data with a low confidence level.

5.4 Non-Ionizing Radiation:

A search of the DoD OEHS Portal database indicated that non-ionizing radiation hazard sources were not present at Camp Bastion.

Short-term and Long-term risks: None identified based on the available data with a low confidence level.

6 Endemic Disease¹

This document lists the endemic disease in the region, its specific risks and severity and general health information about the disease. The general information on how meningococcal meningitis is transmitted from person to person came from the World Health Organization's (WHO) Fact Sheet No. 141 on Meningococcal Meningitis.

6.1 Foodborne and Waterborne Diseases

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

6.2.1 Diarrheal diseases (bacteriological)

Diarrheal diseases can be expected to temporarily incapacitate a very high percentage of personnel (potentially over 50 percent per month) within days if unapproved 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 these result 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 require greater than 72 hours limited duty, or hospitalization.

6.2.2 Hepatitis A, typhoid fever, and diarrhea-protozoal

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

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 are mitigated with military preventive medicine measures/policies.

6.2.3 Short-term and Long-term Health Risks:

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

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

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 risk in Afghanistan, is capable of debilitating a high percentage of personnel for up to a week or more. In addition, other vector-borne diseases are transmitted at low or unknown levels and may constitute a significant risk.

6.2.1 Malaria

Malaria incidents are often determined based on the presence of agriculture activity, including irrigation systems, which provide breeding habitats for vectors. In the Camp Bastion region small number of cases (less than 1 percent per month attack rate) could occur among personnel exposed to mosquito bites. Malaria incidents can 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, and fatalities can occur.

6.2.2 Leishmaniasis

Leishmaniasis is transmitted by sand flies. The disease risk is highest when sand flies are most prevalent in March through November. 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 US when infections become symptomatic years later. However, in the Camp Bastion region there are only a small number of cases (less than 1 percent per month attack rate). Cutaneous infection is unlikely to be debilitating, though lesions can be disfiguring. Visceral leishmaniasis causes a severe febrile illness which typically requires hospitalization with convalescence over 7 days.

6.2.3 Crimean-Congo hemorrhagic fever

Crimean-Congo hemorrhagic fever most commonly occurs in rare cases (less than 0.1 percent per month attack rate) and is transmitted by tick bites or occupational contact with blood or secretions from infected animals. It is a very severe illness typically requiring intensive care with fatality rates from five to fifty percent. The risk is moderate but cases are rare.

6.2.4 Sandfly fever

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

6.2.5 Plague

Plague is present in rare cases and typically occurs in more urban areas. It is reservoirized by rats and transmitted by their flea populations; this disease is associated with a low risk estimate. Incidents can result in potentially severe illness which may require more than 7 days of hospitalization and convalescence.

6.2.6 Typhus-miteborne

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

6.2.7 West Nile fever

West Nile fever is present and is maintained by the bird population and mosquitoes that help to transfer the diseases from birds to humans. The majority of infections in young, healthy adults are asymptomatic although it can result in fever, headache, tiredness, and body aches, occasionally with a skin rash (on the trunk of the body) and swollen lymph glands. This disease is associated with a low risk estimate.

6.2.8 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.

6.2.9 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

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

6.3.1 Leptospirosis

Leptospirosis is present in Afghanistan but at unknown levels. Human infection occurs through exposure to water or soil contaminated by infected animals and has been 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 pass directly into surface waters. Leptospirosis can enter the body through cut or abraded skin, mucous membranes, and conjunctivae. Ingestion of contaminated water can also lead to infection. The acute generalized illness associated with infection can mimic other tropical diseases (for example, dengue fever, malaria, and typhus), and common symptoms include fever, chills, myalgia,

nausea, diarrhea, cough, and conjunctival suffusion. Manifestations of severe disease can include jaundice, renal failure, hemorrhage, pneumonitis, and hemodynamic collapse. Recreational activities involving extensive water contact may result in personnel being temporarily debilitated with leptospirosis.

6.3.2 Short-term health risks:

Low: Low (for leptospirosis because Camp Bastion is in an area of barren desert, near no water areas). Confidence in risk estimate is medium.

6.3.3 Long-term health risks:

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

6.4 Respiratory Diseases

6.4.1 Tuberculosis (TB)

Tuberculosis (TB) poses a moderate year round risk to U.S. personnel in Afghanistan. Tuberculosis is usually transmitted through close and prolonged exposure to an active case of pulmonary or laryngeal tuberculosis, but can also occur with 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.

6.4.2 Meningococcal meningitis

Meningococcal meningitis poses a low risk and is transmitted from person to person through droplets of respiratory or throat secretions. Close and prolonged contact facilitates the spread of this disease.

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 is medium.

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

6.5 Animal-Contact Diseases

6.5.1 Rabies

Rabies poses a year-round moderate risk. Occurrence is well above U.S. levels due to the lack of organized control programs. Dogs are the primary sources of human exposure to rabies in Afghanistan, and canine rabies is the most common rabies strain. 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.

6.5.2 Anthrax

Anthrax poses a year-round moderate risk, but cases are rare. Anthrax is a naturally occurring infection; cutaneous anthrax is transmitted by direct contact with infected animals or carcasses, including hides. Eating undercooked infected meat can result in contracting Gastrointestinal Anthrax. Pulmonary Anthrax is contracted through inhalation of spores and is extremely rare.

6.5.3 Q-Fever

Q-Fever poses a year-round moderate risk. Rare cases are possible among personnel exposed to direct contact with infected livestock and domesticated animals or contaminated manure straw or dust in areas where herd animals are sheltered and grazed. Significant outbreaks (affecting 1-50 percent) 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.

6.5.4 H5N1 avian influenza

H5N1 avian influenza poses a year-round negligible risk. No illnesses were reported in U.S. personnel, however those who have close contact with birds or poultry have 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 is medium.

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

7 Venomous Animal/Insect

7.1 Snakes, scorpions, and spiders

Nine species of poisonous snakes (*Boiga trigonata*, *Echis multisquamatus*, *Echis sochureki*, *Eristocophis mcmahoni*, *Hemorrhis ravergeri*, *Macrovipera lebetina turanica*, *Naja oxiana*, *Pseudocerastes persicus*, *Telescopus rhinopoma*) have acknowledged geographical ranges that encompass Camp Bastion, although identification at the site is unknown. Venom effects from these species range from minor local pain to potential lethality.

Seventeen species of poisonous scorpions (*Afghanobuthus naumanni*, *Androctonus afghanu*, *Androctonus amoreux*, *Androctonus baluchicus*, *Compsobuthus rugosulus*, *Compsobuthus tofti*, *Hottentotta alticola*, *Hottentotta saulcyi*, *Mesobuthus caucasicus*, *Mesobuthus eupeus*, *Mesobuthus macmahoni*, *Orthochirus afghanus*, *Orthochirus bicolor*, *Orthochirus jalalabadensis*, *Orthochirus pallidus*, *Orthochirus samrchelsis*, *Orthochirus scrobiculosus*) have acknowledged geographical ranges that encompass Camp Bastion, although identification at the site is unknown. Venom effects range from short-lived local effects such as pain to potential lethality.

One species of poisonous spiders (*Latrodectus dahlia*) has an acknowledged geographical range that encompasses Camp Bastion, although identification at the site is unknown. Venom effects are primarily minor and envenoming is unlikely to be lethal.

Routine pest control measures are conducted at both of these locations and risk can be further reduced through preventive medicine controls (antivenom treatments).

Short-term health risks: Low. Confidence in risk estimate is medium.

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

8 Heat/Cold Stress

8.1 Heat

Summer (June - September) monthly mean temperatures range from 91 °F to 109 °F with an average temperature of 102 °F based on historical climatological data from the National Oceanic and Atmospheric Administration (NOAA). The health risk of heat stress/injury based on temperatures alone is Low (< 78 °F) from November – February, moderate (78-81.9°F) from March to April, high (82-87.9°F) in October, and extremely high (≥ 88°F) from May to September. However, work intensity and clothing/equipment worn pose greater health risk of heat stress/injury than environmental factors alone (Goldman 2001). Managing risk of hot weather operations included monitoring work/rest periods, proper hydration, and taking individual risk factors (e.g. acclimation, weight, and physical conditioning) into consideration. Risk of heat stress/injury was reduced with preventive measures

8.1.1 Short-term health risk:

Low to Extremely High, mitigated to Low: Risk of heat injury in unacclimatized or susceptible populations (older, previous history of heat injury, poor physical condition, underlying medical/health conditions), and those under operational constraints (equipment, PPE, vehicles) is extremely high from May to September, high in October, moderate from March to April, and low from November to February. The risk of heat injury was reduced to low through preventive measures such as work/rest cycles, proper hydration and nutrition, and monitoring WBGT. Confidence in the health risk estimate is low (Reference 7, 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 7, Table 3-6).

8.2 Cold

8.2.1 Short-term health risks:

Winter (December - March) temperatures range from 39 °F to 52 °F with an average temperature of 44 °F based on historical climatological data from the NOAA. 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 year round when temperatures fall below 60 °F. 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. 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 medium.

9 Noise

9.1 Continuous

No specific hazard sources were documented in the DOEHRS or MESL from 2006 to 2009 timeframe.

9.1.1 Short and long-term health risks:

Not evaluated.

9.2 Impulse

No specific hazard sources were documented in the DOEHRS or MESL from 2006 to 2009 timeframe.

9.2.1 Short-term and Long-term health risks:

Not evaluated.

10 Unique Incidents/Concerns

10.1 Fuel/petroleum products/industrial chemical spills

No data available.

10.2 Waste Sites/Waste Disposal:

No data available.

10.3 Asbestos:

No data available.

10.4 Lead Based Paint:

No data available.

10.5 Pesticides/Pest Control:

As DoD policy, pesticides are released to the Camp Bastion, Afghanistan environment as part of a planned program incorporating continuous monitoring, education, record-keeping, and communication to prevent pests and disease vectors from causing unacceptable damage to operations, people, property, materiel, or the environment.

An Environmental Industrial Hazards Role 2 Assessment, completed 15 November 2009 at Camp Bastion, confirmed pest control activities were being accomplished by formally contracted civilian pest management specialists, and that some pesticide products were stored and staged on-site. No reports

are on file describing significant releases of concentrate pesticide formulations or pesticide dilutions as a result of pesticide storage, handling, and staging activities.

Pesticides used at Camp Bastion include rodenticides (bromadiolone and brodifacoum) and insecticides (nithiazine, imidacloprid, and methomyl). The rodenticides are highly acutely toxic to humans and the insecticides range between moderately and highly acutely toxic. The potential for exposure through the dermal and inhalation routes is low and application techniques mitigate risk from accidental oral exposure.

Short-term and Long-term risks: **Low**. Confidence in the health risk assessment is medium (Reference 7, Table 3-6).

10.6 Burn Pits:

Open burn pits are found on the north sides of Camp Bastion and Camp Leatherneck. These burn pits are used for the disposal, reduction and sanitization of domestic, catering and non hazardous wastes that are generated within both Camp Bastion (BSN) 1 and 2. Combustible, nonhazardous waste from Coalition Units and UK contractors is also disposed of within this facility. Incinerators are also used at the site but on a small scale and are primarily used for medical waste. Burn pit workers and any other personnel that work at or in close proximity of the burn pits may have a higher risk of exposure to burn pit emissions than the general population at Camp Bastion.

While not specific to Camp Bastion, the consolidated epidemiological and environmental sampling and studies on burn pits that have been conducted as of the date of this publication have been unable to determine whether an association does or does not exist between exposures to emissions from the burn pits and long-term health effects (Reference 10). The Institute of Medicine's review of long-term health consequences of exposure to burn pits in Iraq and Afghanistan suggests that service in Iraq or Afghanistan (i.e., a broader consideration of air pollution than exposure only to burn pit emissions) may be associated with long-term health effects, particularly in susceptible (e.g., those who have asthma) or highly exposed subpopulations, such as those who worked at 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 References²

1. Casarett and Doull's Toxicology: the Basic Science of Exposures, Chapter 2- Principles of Toxicology; Fifth Edition, McGraw Hill, New York.
2. Defense Occupational and Environmental Health Readiness System (referred to as the DOEHRSEH 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 OEHS Data Portal: <https://doehsportal.apgea.army.mil/doehrs-oehs/> . 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. Occupational and Environmental Health Site Assessment (OEHSA), 2009.
7. USA PHC TG230, June 2010 Revision, Version 20
8. USACHPPM 2008 Particulate Matter Factsheet; 64-009-0708, 2008
9. Environmental Health Team United Kingdom Joint Force Medical Group Camp BASTION Operation HERRICK 9 BFPO 792, CAMP BASTION BURN PIT – COMBUSTION TIMES, 20 October 2008.
10. IOM (Institute of Medicine). 2011. Long-term health consequences of exposure to burn pits in Iraq and Afghanistan. Washington, DC: The National Academies Press.

² NOTE. The DOEHRSEH database was queried to obtain the available sample data for air, soil, and drinking and non-drinking water sources at Camp Bastion. The data are currently assessed using the final draft TG230 2010 Revision (V20) and MEGs (Version 20) described above. The general method involves an initial review of the data which eliminates all chemical substances not detected above 1-yr negligible MEG. Those substances screened out are not considered acute or chronic health hazards so are not assessed further. For remaining substances, acute and chronic health effects are evaluated separately for air and water (soil is only evaluated for long term risk). This is performed by deriving separate short-term and long term population exposure level estimates (referred to as population exposure point concentrations (PEPC) that are compared to MEGs derived for similar exposure durations. If less than or equal to negligible MEG the risk is Low. If levels are higher than negligible then there is a chemical-specific toxicity and exposure evaluation by appropriate SMEs, which includes comparison to any available marginal, critical or catastrophic MEGs. For drinking water 15 L/day MEGs are used for the screening while site specific 5-15 L/day are used for more detailed assessment. For non-drinking water (such as that used for personal hygiene or cooking) the 'consumption rate' is limited to 2 L/day (similar to the EPA) which is derived by multiplying the 5 L/day MEG by a factor of 2.5. 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.nmcphc.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>