Military Deployment
Periodic Occupational and Environmental Monitoring Summary (POEMS): Camp Dwyer and vicinity, Afghanistan
Calendar Year: 2015

AUTHORITY: This periodic occupational and environmental monitoring summary (POEMS) has been developed in accordance with Department of Defense (DoD) Instructions 6490.03, 6055.05, and JCSM (MCM) 0017-12 (References 1-3).

PURPOSE: This POEMS documents the Department of Defense (DOD) assessment of occupational and environmental health (OEH) risk for Camp Dwyer and vicinity that includes Achmed, Patrol Base (PB) Alamo, PB Amboy, Amir, Amir Agha, PB Barcha, Blackbird, Bury, PB Darvishan, Delhi, Divilak, Donahue, Combat Outpost (COP) Doost, DPHQ, PB Durzay, PB Empire, PB Fern Gully, Gators, PB Glavey, Gorgak, PB Haji Achmed, observation post (OP) Hand, PB Harris, OP Hassanabad, PB Hernandez, PB Johnson, Jugroom, PB Kadalo Drab, COP Karma, Khan Neshin Castle, PB Kherybad, OP Khojibad, COP Koshtay, OP KT4, Kupak, Laki, Landay, CP Marler, PB Masood, Mays, Mian Poshtay, Montana (OP), PB Pay Bandar, PB Paygel, Payne, PB Paygel, Qal Ye Now, Rankel, Regi Tapa, Rhino, PB Schoolhouse, PB Shamalan, PB Shamshad, Shawqat, Sharp, Shinwar, South Station, PB Sre Kala, Styx, COP Taghaz, PB Tar, PB Torbert, PB Tuffan, PB Walli, PB Wazirabad, PB Wolfpack, and PB Wood. It presents a qualitative summary of health risks identified at these locations and their potential medical implications. The report is based on information collected from 01 January 2015 through 31 December 2015 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 Dwyer and vicinity during this period was performed at representative exposure points selected to characterize health risks at the *population–level*. Due to the nature of environmental sampling, the data upon which this report is based may not be fully representative of all the fluctuations in environmental quality or capture unique occurrences. While one might expect health risks pertaining to historic or future conditions at this site to be similar to those described in this report, the health risk assessment is limited to 01 January 2015 through 31 December 2015.

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

SITE DESCRIPTION: Camp Dwyer and the other associated base camps in this assessment were located in the southern portion of Helmand Province. Prior to 2009, Dwyer was a British Forward Operating Base; in 2009, it was transferred to the United States of America. North, South, and West of Camp Dwyer is desert with no industry, agriculture, or residential areas within at least 6 miles. East of the camp is desert for approximately 4 miles until the Helmand River valley; residential and agricultural areas are present along the river valley. The surface of the camp is covered with rock aggregate gravel on top of a fine powder mixture of sand-clay and silt, known as “moon dust.” Lightweight maintenance enclosures are used for vehicle and

heavy equipment maintenance. Semi-permanent structures (huts, steel frame buildings, and improvised structures) are used for housing, showers, and office space.

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

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

***Short-term health risks and medical implications*:**

The following hazards may be associated with potential acute health effects in some personnel during deployment at Camp Dwyer and vicinity:

Ionizing radiation; food/waterborne diseases (e.g., bacterial diarrhea, hepatitis A, typhoid/paratyphoid fever, diarrhea-cholera, diarrhea-protozoal, brucellosis, hepatitis E); other endemic diseases (malaria, cutaneous leishmaniasis (acute), Crimean-Congo hemorrhagic fever, sandfly fever, scrub typhus (mite-borne), leptospirosis, Tuberculosis (TB), rabies, anthrax, Q fever); heat stress; and continuous noise.

For ionizing radiation, Camp Dwyer had a Combat Support Hospital with several ionizing radiation sources, such as medical X-ray and CAT scanners. Exposure limiting controls such as concrete barriers and warning signs were in place. The short-term risks were 'Moderate, reduced to Low with exposure limiting controls,' for the radiology staff and personnel frequently in the X-ray and CAT scan hazard area. The short-term risks were 'Low' for persons not working in the combat support hospital. For food/waterborne diseases (e.g., bacterial diarrhea, hepatitis A, typhoid/paratyphoid fever, diarrhea-cholera, diarrhea-protozoal, brucellosis, hepatitis E), if ingesting local food and water, the health effects can temporarily incapacitate personnel (diarrhea) or result in prolonged illness (hepatitis A, typhoid/paratyphoid fever, brucellosis, hepatitis E). Risks from food/waterborne diseases may have been reduced with preventive medicine controls and mitigation, which includes hepatitis A and typhoid fever vaccinations and only drinking from approved water sources in accordance with standing U.S. Central Command (CENTCOM) policy. For other vector-borne endemic diseases (malaria, cutaneous leishmaniasis (acute), Crimean-Congo hemorrhagic fever, sandfly fever, scrub typhus (mite-borne), these diseases may constitute a significant risk due to exposure to biting vectors; risk reduced to 'Low' by proper wear of the treated uniform, application of repellent to exposed skin, bed net use, and appropriate chemoprophylaxis, as well as minimizing areas of standing water and other vector-breeding areas. For water contact diseases (leptospirosis) activities involving extensive contact with surface water increase risk. For respiratory diseases (TB), personnel in close-quarter conditions could have been at risk for person-to-person spread. Animal contact diseases (rabies, anthrax, Q fever), pose year-round risk. For heat stress, risk can be greater during months of April through October, and greater for susceptible persons including those older than 45, of low fitness level, unacclimatized, or with underlying medical conditions, and those under operational constraints (equipment, PPE, vehicles). Risks from heat stress may have been reduced with preventive medicine controls, work-rest cycles, proper hydration and nutrition, and mitigation. For continuous noise exposure, the short-term risk was 'Moderate'; risk may have been reduced by appropriate hearing protection used by personnel in higher risk areas (around sources of continuous noise such as flightline and power production).

Air quality: For inhalable coarse particulate matter (PM) less than 10 micrometers in diameter (PM_{10}) from environmental dust, the PM_{10} overall short-term risk was 'not evaluated due to no data.' For inhalable fine PM less than 2.5 micrometers in diameter ($PM_{2.5}$) from environmental dust, the $PM_{2.5}$ overall short-term risk was 'not evaluated due to insufficient data.' However, the area was a dust-prone desert environment, with vehicle traffic and an arid climate. Consequently, exposures to PM_{10} and $PM_{2.5}$ may have varied, as conditions may have varied, and 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, particularly exposures to high levels of dust such as during high winds or dust storms. For PM_{10} and $PM_{2.5}$, certain subgroups of the deployed forces (e.g., those with pre-existing asthma/cardio-pulmonary conditions) are at greatest risk of developing notable health effects. Although most short-term health effects from exposure to PM should have resolved post-deployment, providers should be prepared to consider the relationship between deployment exposures and current complaints. Some individuals may have sought treatment for acute respiratory irritation while at Camp Dwyer and vicinity. Personnel who reported with symptoms or required treatment while at this site should have exposure and treatment noted in medical record (e.g., electronic medical record and/or on a SF 600 (Chronological Record of Medical Care)).

Long-term health risks and medical implications:

The following hazards may be associated with potential chronic health effects in some personnel during deployment at Camp Dwyer and vicinity:

For ionizing radiation, Camp Dwyer had a Combat Support Hospital with several ionizing radiation sources, such as medical X-ray and CAT scanners. Exposure limiting controls such as concrete barriers and warning signs were in place. The long-term risks were 'Moderate, reduced to Low with exposure limiting controls,' for the radiology staff and personnel frequently in the X-ray and CAT scan hazard area. The long-term risks were 'Low' for persons not working in the combat support hospital.

For continuous noise exposure, the long-term risk was 'Moderate to High'; risk may have been reduced by appropriate hearing protection used by personnel in higher risk areas (around sources of continuous noise such as flightline and power production).

Long-term health risks & medical implications (continued):

Air quality: For inhalable fine PM less than 2.5 micrometers in diameter ($PM_{2.5}$) from environmental dust, the overall long-term risk was not evaluated because data were insufficient to characterize risk level. Inhalable coarse PM less than 10 micrometers (µm) in diameter (PM_{10}) from environmental dust was not evaluated for long-term risk due to no health guidelines. However, the area was a dust-prone desert environment, with vehicle traffic and an arid climate, and conditions may have varied. For inhalational exposure to high levels of dust containing PM_{10} and $PM_{2.5}$ from high winds or dust storms, it is considered possible that some otherwise healthy personnel, who were exposed for a long-term period to dust and particulate matter, could develop certain health conditions (e.g., reduced lung function, cardiopulmonary disease). Personnel with a history of asthma or cardiopulmonary disease could potentially be more likely to develop such chronic health conditions. While the dust and PM exposures and exposures to burn pits are acknowledged, at this time there were no specific recommended, post-deployment medical surveillance evaluations or treatments. Providers should still consider overall individual health status (e.g., any underlying conditions/susceptibilities) and any potential unique individual exposures (such as burn pits/barrels, incinerators, occupational or specific personal dosimeter data) when assessing individual concerns. Certain individuals may need to be followed/evaluated for specific occupational exposures/injuries (e.g., annual audiograms as part of the medical surveillance for those enrolled in the Hearing Conservation Program; and personnel covered by Respiratory Protection Program and/or Hazardous Waste/Emergency Responders Medical Surveillance)

Table 2. Population-Based Health Risk Estimates—Camp Dwyer and vicinity[1, 2]

Source of Identified Health Risk[3]	Unmitigated Health Risk Estimate[4]	Control Measures Implemented	Residual Health Risk Estimate[4]
AIR			
Particulate matter less than 10 micrometers in diameter (PM_{10})	Short-term: No data to evaluate. Acute health effects (e.g., upper respiratory tract irritation) may occur and may be more pronounced during peak days. More serious effects are possible in susceptible persons (e.g., those with asthma/pre-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: No data to evaluate. Acute health effects (e.g., upper respiratory tract irritation) may occur and may be more pronounced during peak days. More serious effects are possible in susceptible persons (e.g., those with asthma/pre-existing respiratory diseases).
	Long-term: No available health guidelines		Long-term: No health guidelines
Particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$)	Short-term: Data were insufficient to characterize risk level. 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.		Short-term: Data were insufficient to characterize risk level. 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: Data were insufficient to characterize risk level. A small percentage of personnel may be at increased risk for developing chronic conditions, particularly those more susceptible to acute effects (e.g., those with asthma/pre-existing respiratory diseases).		Long-term: Data were insufficient to characterize risk level. A small percentage of personnel may be at increased risk for developing chronic conditions, particularly those more susceptible to acute effects (e.g., those with asthma/pre-existing respiratory diseases).
Military Unique			
Ionizing Radiation	Short-term: Low to Moderate. Camp Dwyer had a combat support hospital with several ionizing radiation sources. Ionizing radiation was emitted from medical X-ray and computed tomography (CAT) scanners. Exposure limiting controls such as concrete barriers and warning signs were in place. A Radiological Health Risk Assessment, published 4 April 2013, concluded no individual received an exposure in excess of 0.15 roentgen equivalent man (rem). Short-term risks: Low for persons not working in the combat support hospital. Moderate, reduced to Low with exposure limiting controls, for the radiology staff and personnel frequently in the X-ray and CAT scan hazard area.	Exposure limiting controls such as concrete barriers and posted warning signs.	Short-term: Low. Camp Dwyer had a combat support hospital with several ionizing radiation sources. Ionizing radiation was emitted from medical X-ray and CAT scanners. Exposure limiting controls such as concrete barriers and warning signs were in place. A Radiological Health Risk Assessment, published 4 April 2013, concluded no individual received an exposure in excess of 0.15 rem. Short-term risks: Low for persons not working in the combat support hospital. Moderate, reduced to Low with exposure limiting controls, for the radiology staff and personnel frequently in the X-ray and CAT scan hazard area.
	Long-term: Low to Moderate. Low for persons not working in the combat support hospital. Moderate, reduced to Low with exposure limiting controls, for the radiology staff and personnel		Long-term: Low. Low for persons not working in the combat support hospital. Moderate, reduced to Low with exposure limiting controls, for the radiology staff and personnel

Source of Identified Health Risk[3]	Unmitigated Health Risk Estimate[4]	Control Measures Implemented	Residual Health Risk Estimate[4]
	frequently in the X-ray and CAT scan hazard area.		frequently in the X-ray and CAT scan hazard area
ENDEMIC DISEASE			
Food borne/Waterborne (e.g., diarrhea-bacteriological)	Short-term: Variable; High (bacterial diarrhea, hepatitis A, typhoid fever) to Moderate (diarrhea-cholera, diarrhea-protozoal, brucellosis, hepatitis E) to Low (polio) if ingesting local food/water, the health effects can temporarily incapacitate personnel (diarrhea) or result in prolonged illness (hepatitis A, Typhoid fever, hepatitis E, brucellosis).	Preventive measures include Hepatitis A and Typhoid fever vaccination and consumption of food and water only from approved sources.	Short-term: Low to none
	Long-term: none identified		Long-term: No data available
Arthropod Vector Borne	Short-term: Variable; High for malaria, Moderate for leishmaniasis - cutaneous (acute), Crimean-Congo hemorrhagic fever, sandfly fever, typhus-miteborne; and Low for, the plague and West Nile fever.	Preventive measures include proper wear of treated uniform, application of repellent to exposed skin, bed net use, minimizing areas of standing water and appropriate chemoprophylaxis.	Short-term: Low
	Long-term: Low for Leishmaniasis-visceral infection.		Long-term: No data available
Water-Contact (e.g., wading, swimming)	Short-term: Moderate for leptospirosis	Recreational swimming in surface waters not likely in this area of Afghanistan during this time period.	Short-term: Low for leptospirosis.
	Long-term: No data available		Long-term: No data available
Respiratory	Short-term: Variable; Moderate for tuberculosis (TB) to Low for meningococcal meningitis.	Providing adequate living and work space; medical screening; vaccination.	Short-term: Low
	Long-term: No data available		Long-term: No data available
Animal Contact	Short-term: Variable; Moderate for rabies, anthrax, Q-fever to Low for H5N1 avian influenza.	Prohibiting contact with, adoption, or feeding of feral animals IAW U.S. Central Command (CENTCOM) General Order (GO) 1B. Risks are further reduced in the event of assessed contact by prompt post-exposure rabies prophylaxis IAW The Center for Disease Control's (CDC) Advisory Committee on Immunization Practices guidance.	Short-term: No data available
	Long-term: Low (Rabies)		Long-term: No data available
VENOMOUS ANIMAL/ INSECTS			
Snakes, scorpions, and spiders	Short-term: Low; If encountered, effects of venom vary with species from mild localized swelling (e.g., widow spider) to potentially lethal effects (e.g., central Asian saw-scaled viper).	Risk reduced by avoiding contact, proper wear of uniform (especially footwear), and proper and timely treatment.	Short-term: Low; If encountered, effects of venom vary with species from mild localized swelling (e.g., widow spider) to potentially lethal effects (e.g., central Asian saw-scaled viper).

Source of Identified Health Risk[3]	Unmitigated Health Risk Estimate[4]	Control Measures Implemented	Residual Health Risk Estimate[4]
	Long-term: No data available		Long-term: No data available
HEAT/COLD STRESS			
Heat	Short-term: Variable; Risk of heat injury is High for April-October, and Low for all other months.	Work-rest cycles, proper hydration and nutrition, and Wet-Bulb Globe Temperature (WBGT) monitoring.	Short-term: Variable; Risk of heat injury in unacclimatized or susceptible personnel is Moderate for April-October and Low for all others.
	Long-term: Low, The long-term risk was Low. However, the risk may be greater to certain susceptible persons–those older (i.e., greater than 45 years), in lesser physical shape, or with underlying medical/health conditions.		Long-term: Low, The long-term risk is Low. However, the risk may be greater to certain susceptible persons–those older (i.e., greater than 45 years), in lesser physical shape, or with underlying medical/health conditions.
Cold	Short-term: Low risk of cold stress/injury.	Risks from cold stress reduced with protective measures such as use of the buddy system, limiting exposure during cold weather, proper hydration and nutrition, and proper wear of issued protective clothing.	Short-term: Low risk of cold stress/injury.
	Long-term: Low; Long-term health implications from cold injuries are rare but can occur, especially from more serious injuries such as frost bite.		Long-term: Low; Long-term health implications from cold injuries are rare but can occur, especially from more serious injuries such as frost bite.
NOISE			
Continuous (Flightline, Power Production)	Short-term: Moderate	Hearing protection used by personnel in higher risk areas	Short-term: Low
	Long-term: High		Long-term: Low
Unique Incidents/ Concerns			
Fuel/petroleum products/ industrial chemical spills	Short-term: Low	Secondary containment of fuel storage	Short-term: Low
	Long-term: Low		Long-term: Low
Pesticides/Pest Control	Short-term: Low	See Section 10.4	Short-term: Low
	Long-term: Low		Long-term: Low
Burn Pits	Short-term: There were no operating burn pits at Camp Dwyer. No samples near/adjacent to any operating burn pits were provided for analysis. Burn pit exposures may vary, and exposure to high levels of PM_{10} and $PM_{2.5}$ in the smoke may also result in mild to more serious short-term health effects (e.g., eye, nose or throat and lung irritation) in some personnel and certain subgroups, such as those with pre-existing health conditions (e.g., asthma, or cardiopulmonary diseases), while at this site.	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: There were no operating burn pits at Camp Dwyer. No samples near/adjacent to any operating burn pits were provided for analysis. Burn pit exposures may vary, and exposure to high levels of PM_{10} and $PM_{2.5}$ in the smoke may also result in mild to more serious short-term health effects (e.g., eye, nose or throat and lung irritation) in some personnel and certain subgroups, such as those with pre-existing health conditions (e.g., asthma, or cardiopulmonary diseases), while at this site.
	Long-term: No data available to evaluate		Long-term: No data available to evaluate.

Source of Identified Health Risk[3]	Unmitigated Health Risk Estimate[4]	Control Measures Implemented	Residual Health Risk Estimate[4]

[1]This Summary Table provides a qualitative estimate of population-based short and long-term health risks associated with the occupational environment conditions at Camp Dwyer and vicinity. It does not represent an individual exposure profile. Actual individual exposures and health effects depend on many variables. For example, while a chemical may have been present in the environment, if a person did not inhale, ingest, or contact a specific dose of the chemical for adequate duration and frequency, then there may have been no health risk. Alternatively, a person at a specific location may have experienced a unique exposure, which could result in a significant individual exposure. Any such person seeking medical care should have their specific exposure documented in an SF 600.

[2] This assessment is based on specific environmental sampling data and reports obtained from 01 January 2015 through 31 December 2015. Sampling locations are assumed to be representative of exposure points for the camp population but may not reflect all the fluctuations in environmental quality or capture unique exposure incidents.

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

[4]Health risks in this Summary Table are based on quantitative surveillance thresholds (e.g. endemic disease rates; host/vector/pathogen surveillance) or screening levels (e.g., Military Exposure Guidelines (MEGs)) for chemicals. Some previous assessment reports may provide slightly inconsistent health risk estimates because quantitative criteria such as MEGs may have changed since the samples were originally evaluated and/or because this assessment makes use of all historic site data while previous reports may have only been based on a select few samples.

1 Discussion of Health Risks at Camp Dwyer and Vicinity, Afghanistan by Source

The following sections provide additional information about the OEH conditions summarized above. All risk assessments were performed using the methodology described in the USAPHC Technical Guide 230 (*Environmental Health Risk Assessment and Chemical Exposure Guidelines for Deployed Military Personnel*) (Reference 4). All OEH risk estimates represent residual risk after accounting for preventive controls in place. Occupational exposures and exposures to endemic diseases are greatly reduced by preventive measures. For environmental exposures related to airborne dust, there are limited preventive measures available, and available measures have little efficacy in reducing exposure to ambient conditions.

The ProUCL version 5.0 software package was used for statistical analyses (Reference 5). Means are followed by standard deviation (SD). Risk characterization was based on the 95% upper confidence level of the arithmetic mean (95% UCL) or the arithmetic mean depending on the quality and quantity of the data being evaluated. The sample mean is an uncertain estimate of the true mean of the population exposure point concentration (PEPC). The 95% UCL reduces the uncertainty inherent in the sample mean and states with a higher level of confidence that the mean PEPC is no greater than the 95% UCL.

2 Air

2.1 Site-Specific Sources Identified

Camp Dwyer was situated in a dusty semi-arid desert environment. Inhalational exposure to high levels of dust and PM, such as during high winds or dust storms, may result in mild to more serious short-term health effects (e.g., eye, nose or throat and lung irritation) in some personnel. Additionally, certain subgroups of the deployed forces (e.g., those with pre-existing asthma/cardio pulmonary conditions) are at greatest risk of developing notable health effects.

2.2 Particulate matter

Particulate matter is a complex mixture of extremely small particles suspended in the air. The PM includes solid particles and liquid droplets emitted directly into the air by sources such as, power plants, motor vehicles, aircraft, generators, construction activities, fires, and natural windblown dust. The PM can include sand, soil, metals, volatile organic compounds (VOCs), allergens, and other compounds such as nitrates or sulfates that are formed by condensation or transformation of combustion exhaust. The PM composition and particle size vary considerably depending on the source. Generally, PM of health concern is divided into two fractions: PM_{10}, which includes inhalable coarse particles with a diameter of 10 µm or less, and fine particles less than 2.5 µm ($PM_{2.5}$), which can reach the deepest regions of the lungs when inhaled. Exposure to excessive PM is linked to a variety of potential health effects.

2.3 Particulate matter, less than10 µm (PM_{10})

2.3.1 Exposure Guidelines:

Short-term (24-hour) PM_{10} (micrograms per cubic meter, µg/m^3):

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

Long-term PM_{10} MEG (µg/m^3):

- Not defined and not available.

2.3.2 Sample data/Notes:

No PM_{10} samples were provided for analysis between 01 January 2015 and 31 December 2015.

2.3.3 Short-term health risks:

Not evaluated. No data to evaluate.

2.3.4 Long-term health risk:

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

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

2.4.1 Exposure Guidelines:

Short-term (24-hour) $PM_{2.5}$ (µg/m^3):

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

Long-term (1-year) $PM_{2.5}$ MEGs (µg/m^3):

- Negligible MEG = 15
- Marginal MEG = 65

2.4.2 Sample data/Notes:

A total of four valid $PM_{2.5}$ air samples were collected from Camp Dwyer in 2015. The range of 24-hour $PM_{2.5}$ concentrations was 55 µg/m^3 – 383 µg/m^3 with an average concentration of 266 µg/m^3.

2.4.3 Short-term health risks:

Not enough data to evaluate: The average and maximum concentrations of $PM_{2.5}$ in 2015 exceed the 24-hour Marginal MEG; however, there was not enough sample data for further evaluation. Four samples are not sufficient for risk evaluation.

2.4.4 Long-term health risks:

Not enough data to evaluate: The average concentration of $PM_{2.5}$ in 2015 exceed the 1-year Marginal MEG; however, there was not enough sample data for further evaluation. Four samples are not sufficient for risk evaluation.

2.5 Airborne Metals

2.5.1 Sample data/Notes:

A total of four valid $PM_{2.5}$ airborne metal samples were collected at Camp Dwyer in 2015. There were no detectable metals in these samples.

2.5.2 Short and long-term health risks:

Not evaluated. No parameters were detected to evaluate.

2.6 Volatile Organic Compounds

2.6.1 Sample data/Notes:

No VOC samples were provided for analysis between 01 January 2015 and 31 December 2015.

2.6.2 Short and long-term health risks:

Not evaluated. No data to evaluate.

3 Soil

3.1 Site-Specific Sources Identified

3.2 Sample data/Notes:

The primary soil contamination exposure pathways are dermal contact and dust inhalation. Typical parameters analyzed for included semi volatile organic compounds (SVOCs), heavy metals, polychlorinated biphenyls (PCBs), pesticides, and herbicides. If the contaminant was known or suspected, other parameters may have been analyzed for (i.e., total petroleum hydrocarbons (TPH) and polycyclic aromatic hydrocarbons (PAH) near fuel spills). For the risk assessment, personnel are assumed to remain at this location for 6 months to 1 year. No soil samples were provided for analysis between 01 January 2015 and 31 December 2015.

3.3 Short and long-term health risk:

Not evaluated. No data to evaluate.

4 Water

In order to assess the health risk to U.S. personnel from exposure to water in theater, the USAPHC identified the most probable exposure pathways. These are based on the administrative information provided on the field data sheets submitted with the samples taken over the time period being evaluated. Based on the information provided from the field, all

samples for untreated water were associated with source water for treatment and no exposure pathways were associated with those samples. Therefore, untreated samples are not assessed as potential health hazards. It is assumed that 100% of all U.S. personnel at Camp Dwyer and vicinity will be directly exposed to reverse osmosis water purification unit (ROWPU) treated and disinfected fresh bulk water, since this classification of water is primarily used for personal hygiene, showering, cooking, and for use at vehicle wash racks. Field data sheets indicate that bottled water is the only approved source of drinking water.

4.1 Drinking Water: Bottled or Packaged Water

4.1.1 Site-Specific Sources Identified:

4.1.2 Sample data/Notes:

No bottled water samples were provided for analysis between 01 January 2015 and 31 December 2015.

4.1.3 Short-term and long-term health risks:

Not evaluated. No data to evaluate.

4.2 Non-Drinking Water: Disinfected

4.2.1 Site-Specific Sources Identified:

Although the primary route of exposure for most microorganisms is ingestion of contaminated water, dermal exposure to some microorganisms, chemicals, and biologicals may also cause adverse health effects. Complete exposure pathways would include drinking, brushing teeth, personal hygiene, cooking, providing medical and dental care using a contaminated water supply or during dermal contact at vehicle or aircraft wash racks.

4.2.2 Sample data/Notes:

To assess the potential for adverse health effects to troops the following assumptions were made about dose and duration: all U.S. personnel at this location were expected to remain at this site for approximately 1 year. A conservative (protective) assumption is that personnel routinely consumed less than 5 liters per day (L/day) of non-drinking water for up to 365 days (1 year). It is further assumed that control measures and/or personal protective equipment were not used. A total of two disinfected bulk water (non-drinking) samples from Dwyer on 17 December 2015 were evaluated for this health risk assessment. No chemicals were detected at levels above the short- or long-term MEGs.

4.2.3 Short- and long-term health risks:

None identified based on available sample data. All collected samples were below the short and long-term Negligible MEGs; however, two samples is a small data set and may not be representative.

5 Military Unique

5.1 Chemical Biological, Radiological, Nuclear (CBRN) Weapons

No specific hazard sources were documented in the Defense Occupational and Environmental Health Readiness System (DOEHRS) or the Military Exposure Surveillance Library (MESL) from 01 January 2015 through 31 December 2015 (References 1 and 5).

5.2 Depleted Uranium (DU)

No specific hazard sources were documented in the DOEHRS or MESL from 01 January 2015 through 31 December 2015 (References 1 and 5).

5.3 Ionizing Radiation

Camp Dwyer had a combat support hospital with several ionizing radiation sources. Ionizing radiation was emitted from medical X-ray and CAT scanners. Exposure limiting controls such as concrete barriers and warning signs were in place. A Radiological Health Risk Assessment, published 4 April 2013, concluded no individual received an exposure in excess of 0.15 rem. The short-term and long-term health risks:

Low to Moderate: Low for persons not working in the combat support hospital. Moderate, reduced to Low with exposure limiting controls, for the radiology staff and personnel frequently in the X-ray and CAT scan hazard area. Confidence in the health risk assessment is low (Reference 4, Table 3-6).

5.4 Non-Ionizing Radiation

No specific hazard sources were documented in the DOEHRS or MESL from 01 January 2015 through 31 December 2015 (References 1 and 5).

6 Endemic Diseases

This document lists the endemic diseases reported in the region, its specific health risks and severity and general health information about the diseases. CENTCOM Modification (MOD) 12 (Reference 6) lists deployment requirements, to include immunizations and chemoprophylaxis, in effect during the timeframe of this summary.

6.1 Food borne and Waterborne Diseases

Foodborne and waterborne diseases in the area are transmitted through the consumption of local food and water. Local unapproved food and water sources (including ice) are heavily contaminated with pathogenic bacteria, parasites, and viruses to which most U.S. Service members have little or no natural immunity. Effective host nation disease surveillance does not exist within the country. Only a small fraction of diseases are identified or reported in host nation personnel. Diarrheal diseases are expected to temporarily incapacitate a very high percentage of U.S. personnel within days if local food, water, or ice is consumed. Hepatitis A and typhoid fever infections typically cause prolonged illness in a smaller percentage of unvaccinated personnel. Vaccinations are required for DOD personnel and contractors. In addition, although not specifically assessed in this document, significant outbreaks of viral

gastroenteritis (e.g., norovirus) and food poisoning (e.g., *Bacillus cereus*, *Clostridium perfringens*, *Staphylococcus*) may occur. Key disease risks are summarized below:

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

6.1.1 Diarrheal diseases (bacteriological):

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

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

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

6.1.3 Polio:

Low: Potential health risk to U.S. personnel is Low. Despite a concerted global eradication campaign, poliovirus continues to affect children and adults in Afghanistan, Pakistan, and some African countries. Polio is a highly infectious disease that invades the nervous system. The virus is transmitted by person-to-person, typically by hands, food or water contaminated with fecal matter or through direct contact with the infected person's saliva. An infected person may spread the virus to others immediately before and about 1 to 2 weeks after symptoms appear. The virus can live in an infected person’s feces for many weeks. About 90% of people infected have no symptoms, and about 1% have a very severe illness leading to muscle weakness, difficulty breathing, paralysis, and sometimes death. People who do not have symptoms can still pass the virus to others and make them sick.

6.1.4 Short-term Health Risks:

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

6.1.5 Long-term Health Risks:

None identified based on available data.

6.2 Arthropod Vector-Borne Diseases

During the warmer months, the climate and ecological habitat support populations of arthropod vectors, including mosquitoes, ticks, mites, and sandflies. Significant disease transmission is sustained countrywide, including urban areas. Malaria, the major vector-borne health risk in Afghanistan, is capable of debilitating a high percentage of personnel for up to a week or more. Mitigation strategies were in place and included proper wear of treated uniforms, application of repellent to exposed skin, and use of bed nets and chemoprophylaxis (when applicable). Additional methods included the use of pesticides, reduction of pest/breeding habitats, and engineering controls.

6.2.1 Malaria:

High, mitigated to Low: Potential unmitigated risk to U.S. personnel is High during warmer months (typically April through November) but reduced to Low with mitigation measures. Malaria incidents are often associated with the presence of agriculture activity, including irrigation systems and standing water, which provide breeding habitats for vectors. A small number of cases may occur among personnel exposed to mosquito (Anopheles spp.) bites. Malaria incidents may cause debilitating febrile illness typically requiring 1 to 7 days of inpatient care, followed by return to duty. Severe cases may require intensive care or prolonged convalescence.

6.2.2 Leishmaniasis:

Moderate, mitigated to Low: The disease risk is Moderate during the warmer months when sandflies are most prevalent, but reduced to Low with mitigation measures. Leishmaniasis is transmitted by sandflies. 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 United States when infections become symptomatic years later. Cutaneous infection is unlikely to be debilitating, though lesions may be disfiguring. Visceral leishmaniasis disease can cause severe febrile illness, which typically requires hospitalization with convalescence over 7 days.

6.2.3 Crimean-Congo hemorrhagic fever:

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

6.2.4 Sandfly fever:

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

6.2.5 Plague:

Low: Potential health risk to U.S. personnel is Low year round. Bubonic plague typically occurred as sporadic cases among people who encounter wild rodents and their fleas during work, hunting, or camping activities. Outbreaks of human plague are rare and typically occur in crowded urban settings associated with large increases in infected commensal rats (*Rattus rattus*) and their flea populations. Some untreated cases of bubonic plague may develop into secondary pneumonic plague. Respiratory transmission of pneumonic plague is rare but has the potential to cause significant outbreaks. Close contact is usually required for transmission. In situations where respiratory transmission of plague is suspected, weaponized agent must be considered. Extremely rare cases (less than 0.01% per month attack rate) could occur. Incidence could result in potentially severe illness, which may require more than 7 days of hospitalization and convalescence.

6.2.6 Mite-borne Typhus (scrub typhus**):**

Moderate, mitigated to Low: Potential health risk to U.S. personnel is Moderate during warmer months (typically March through November) when vector activity is highest. Mitigation measures reduced the risk to Low. Miteborne typhus is a significant cause of febrile illness in local populations with rural exposures in areas where the disease is endemic. Large outbreaks have occurred when non-indigenous personnel such as military forces enter areas with established local transmission. The disease is transmitted by the larval stage of trombiculid mites (chiggers), which are typically found in areas of grassy or scrubby vegetation, often in areas, which have undergone clearing and regrowth. Habitats may include sandy beaches, mountain deserts, cultivated rice fields, and rain forests. Although data are insufficient to assess potential disease rates, attack rates can be very high (over 50%) in groups of personnel exposed to heavily infected "mite islands" in focal areas. The disease can cause debilitating febrile illness typically requiring 1 to 7 days of inpatient care, followed by return to duty.

6.2.7 West Nile fever:

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

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

6.3.1 Leptospirosis:

Moderate, mitigated to Low: Human infections occur seasonally (typically April through November) through exposure to water or soil contaminated by infected animals and is associated with wading, and swimming in contaminated, untreated open water. The occurrence of flooding after heavy rainfall facilitates the spread of the organism because as water saturates the environment *Leptospira* present in the soil passes directly into surface waters. *Leptospira* can enter the body through cut or abraded skin, mucous membranes, and conjunctivae. Infection may also occur from ingestion of contaminated water. The acute, generalized illness associated with infection may mimic other tropical disease (e.g., dengue fever, malaria, and typhus), and common symptoms include fever, chills, myalgia, nausea, diarrhea, cough, and conjunctival suffusion. Manifestations of severe disease can include jaundice, renal failure, hemorrhage, pneumonitis, and hemodynamic collapse. Recreational activities involving extensive water contact may result in personnel being temporarily debilitated with leptospirosis. Incidence could result in debilitating febrile illness typically requiring 1 to 7 days of inpatient care, followed by return to duty; some cases may require prolonged convalescence. This disease is associated with a Moderate health risk estimate.

6.3.2 Short-term health risks:

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

6.3.3 Long-term health risks:

None identified based on available data.

6.4 Respiratory Diseases

Although not specifically assessed in this document, deployed U.S. Forces may be exposed to a wide variety of common respiratory infections in the local population. These include influenza, pertussis, viral upper respiratory infections, viral and bacterial pneumonia, and others. The U.S. military populations living in close-quarter conditions are at risk for substantial person-to-person spread of respiratory pathogens. Influenza is of particular concern because of its ability to debilitate large numbers of unvaccinated personnel for several days. Mitigation strategies were in place and included routine medical screenings, vaccination, enforcing minimum space allocation in housing units, implementing head-to-toe sleeping in crowded housing units,

implementation of proper personal protective equipment (PPE) when necessary for healthcare providers and detention facility personnel.

6.4.1 Tuberculosis:

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

6.4.2 Meningococcal meningitis:

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

6.4.3 Short-term health risks:

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

6.4.4 Long-term health risks:

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

6.5 Animal-Contact Diseases

6.5.1 Rabies:

Moderate, mitigated to Low: Rabies posed a year-round Moderate risk. Occurrence in local animals was well above U.S. levels due to the lack of organized control programs. Dogs are the primary reservoir of rabies in Afghanistan, and a frequent source of human exposure. Rabies is transmitted by exposure to the virus-laden saliva of an infected animal, typically through bites, but could occur from scratches contaminated with the saliva. A U.S. Army Soldier deployed to Afghanistan from May 2010 to May 2011 died of rabies in New York on 31 August 2011 (Reference 7). Laboratory results indicated the Soldier was infected from contact with a dog while deployed. Although the vast majority (>99%) of persons who develop rabies disease will do so within a year after a risk exposure, there have been rare reports of individuals presenting with rabies disease up to 6 years or more after their last known risk exposure. Mitigation strategies included command emphasis of CENTCOM GO 1B, reduction of animal habitats, active pest management programs, and timely treatment of feral animal scratches/bites.

6.5.2 Anthrax:

Low: Anthrax cases are rare in indigenous personnel, and pose a Low risk to U.S. personnel. Anthrax is a naturally occurring infection; cutaneous anthrax is transmitted by direct contact with infected animals or carcasses, including hides. Eating undercooked infected meat may result in contracting gastrointestinal anthrax. Pulmonary anthrax is contracted through inhalation of spores and is extremely rare. Mitigation measures included consuming approved food sources, proper food preparation and cooking temperatures, avoidance of animals and farms, dust abatement when working in these areas, vaccinations, and proper PPE for personnel working with animals.

6.5.3 Q-Fever:

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

6.5.4 H5N1 avian influenza:

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

6.5.5 Short-term health risks:

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

6.5.6 Long-term health risks:

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

7 Venomous Animal/Insect

All information was taken directly from the Armed Forces Pest Management Board (AFPMB) (Reference 8) and the Clinical Toxinology Resources web site from the University of Adelaide, Australia (Reference 9). The species listed below have home ranges that overlap the location

of Camp Dwyer and vicinity and may present a health risk if personnel encounter them. See Section 10.4 for more information about pesticides and pest control measures.

7.1 Spiders

- *Latrodectus dahlia* (widow spider): Severe envenoming possible, potentially lethal. However, venom effects are mostly minor and even significant envenoming is unlikely to be lethal.

7.2 Scorpions

- *Androctonus amoreuxi* and *Androctonus baluchicus*: Severe envenoming possible, potentially lethal. Severe envenoming may produce direct or indirect cardio toxicity, with cardiac arrhythmias, cardiac failure. Hypovolaemic hypotension possible in severe cases due to fluid loss through vomiting and sweating.
- *Mesobuthus caucasicus, Mesobuthus eupeus, Mesobuthus macmahoni, Orthochirus bicolor, Orthochirus danielleae*, *Orthochirus erardi*, *Orthochirus pallidus, Orthochirus scrobiculosus,* and *Sassanidotus gracilis*: There are a number of dangerous Buthid scorpions, but there are also some known to cause minimal effects only. Without clinical data, it is unclear where these species fit within that spectrum.
- *Hottentotta alticola*, and *Hottentotta saulcyi*: Moderate envenoming possible but unlikely to prove lethal. Stings by these scorpions are likely to cause only short lived local effects, such as pain, without systemic effects.

7.3 Snakes

- *Echis multisquamatus* (central Asian saw-scaled viper) and *Echis sochureki* (Sochurek's saw-scaled viper): Severe envenoming possible, potentially lethal. Bites may cause moderate to severe coagulopathy and haemorrhagins causing extensive bleeding.
- *Hemorrhis ravergieri* (mountain racer) and *Psammophis lineolatus* (Teer snake): Unlikely to cause significant envenoming. Bites require symptomatic treatment only.
- *Platyceps rhodorachis* (Jan's desert racer): Mild envenoming only, not likely to prove lethal. Requires symptomatic treatment only.

7.4 Short-term health risk

Low: If encountered, effects of venom vary with species from mild localized swelling (e.g., widow spider) to potentially lethal effects (e.g., central Asian saw-scaled viper). See effects of venom above. Mitigation strategies included avoiding contact, proper wear of uniform (especially footwear), and timely medical treatment. Confidence in the health risk estimate is low (Reference 4, Table 3-6).

7.5 Long-term health risk

None identified.

8 Heat/Cold Stress

8.1 Heat

Summer (June - September) monthly mean daily maximum temperatures range from 95 degrees Fahrenheit (°F) to 108 °F with an average temperature of 104 °F based on historical climatological data from the U.S. Air Force Combat Climatology Center, 14th Weather Squadron. The health risk of heat stress/injury based on temperatures alone is Low (< 78 °F) from November to March, and extremely high (≥ 88°F) from April to October. However, work intensity and clothing/equipment worn pose greater health risk of heat stress/injury than environmental factors alone (Reference 10). Managing risk of hot weather operations included monitoring work/rest periods, proper hydration, and taking individual risk factors (e.g., acclimation, weight, and physical conditioning) into consideration. Risk of heat stress/injury was reduced with preventive measures.

8.1.1 Short-term health risk:

Low to High, mitigated to Low: The risk of heat injury was reduced to Low through preventive measures such as work/rest cycles, proper hydration and nutrition, and monitoring WBGT. Risk of heat injury in unacclimatized or susceptible populations (older, previous history of heat injury, poor physical condition, underlying medical/health conditions), and those under operational constraints (equipment, PPE, vehicles) is High from April to October, and Low from November to March. Confidence in the health risk estimate is low (Reference 4, Table 3-6).

8.1.2 Long-term health risk:

Low: The long-term risk is Low. However, the risk may be greater for certain susceptible persons–those older (i.e., greater than 45 years), in lesser physical shape, or with underlying medical/health conditions. Long-term health implications from heat injuries are rare but may occur, especially from more serious injuries such as heat stroke. It is possible that high heat in conjunction with various chemical exposures may increase long-term health risks, though specific scientific evidence is not conclusive. Confidence in these risk estimates is medium (Reference 4, Table 3-6).

8.2 Cold

8.2.1 Short-term health risks:

Winter (December - March) mean daily minimum temperatures range from 32 °F to 51 °F with an average temperature of 39 °F based on historical climatological data from the U.S. Air Force Combat Climatology Center, 14th Weather Squadron. Because even on warm days a significant drop in temperature after sunset by as much as 40 °F can occur, there is a risk of cold stress/injury from September to April. The risk assessment for Non-Freezing Cold Injuries (NFCI), such as chilblain, trench foot, and hypothermia, is Low, based on historical temperature and precipitation data. Frostbite is unlikely to occur because temperatures rarely drop below freezing. However, personnel may encounter significantly lower temperatures during field operations at higher altitudes. As with heat stress/injuries, cold stress/injuries are largely dependent on operational and individual factors instead of environmental factors alone (Reference 10).

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

8.2.2 Long-term health risk:

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

9 Noise

9.1 Continuous

There were several stand-alone generators located throughout Camp Dwyer generating a continuous noise exposure. Workers on or adjacent to flightlines are further exposed to significant noise levels from aircraft. Vehicles also provide a source of occupational exposure to noise. Combat support hospital clinical staffers are exposed to noise when transporting patients from helicopters. Workers are provided appropriate protective equipment when and where needed.

9.1.1 Short-term health risks:

Low to Moderate: Moderate risk for personnel working near major noise sources. Low risk to the majority of personnel working near major noise sources who wear proper hearing protection with a low confidence level due to limited data.

9.1.2 Long-term health risks:

Low to High: Moderate to High risk for personnel not wearing hearing protection (dependent on magnitude, frequency, and duration of exposures). Low risk for personnel working near major noise sources who wear proper hearing protection.

9.2 Impulse

No specific hazard sources were documented in the DOEHRS or MESL from 01 January 2015 through 31 December 2015.

10 Unique Incidents/Concerns

10.1 Potential environmental contamination sources

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

inhalation (air), skin contact, or ingestion; however, exposures through air are generally associated with the highest health risk.

10.2 Waste Sites/Waste Disposal

There was a medical waste incinerator located at Camp Dwyer in the hazardous waste storage area. It incinerated 200 to 500 pounds of regulated medical waste a day and had a 20-foot stack.

10.2.1 Short-term and Long-term health risks:

Not evaluated. No data to evaluate.

10.3 Fuel/petroleum products/industrial chemical spills

There was a central fuel point at Camp Dwyer with JP-8 stored above ground. The central fuel farm had good secondary containment.

At the flightline, there was above ground storage of JP-8. The flightline fuel farm had good secondary containment.

At the Central Asia Development Group (CADG) concrete lot, there was diesel fuel stored above ground for use by CADG only.

10.3.1 Short-term and Long-term health risks:

Low: Low risk with a low confidence level.

10.4 Pesticides/Pest Control:

The health risk of exposure to pesticide residues is considered within the framework of typical residential exposure scenarios, based on the types of equipment, techniques, and pesticide products that have been employed, such as enclosed bait stations for rodenticides, various handheld equipment for spot treatments of insecticides and herbicides, and a number of ready-to-use (RTU) methods such as aerosol cans and baits. The control of rodents required the majority of pest management inputs, with the acutely toxic rodenticides staged as solid formulation lethal baits placed in tamper-resistant bait stations indoors and outdoors throughout cantonment areas. Nuisance insects, including biting and stinging insects such as bees, wasps, and ants, also required significant pest management inputs. Use of pesticides targeting against these pests generally involved selection of compounds with low mammalian toxicity and short-term residual using pinpoint rather than broadcast application techniques. No specific hazard sources were documented in DOEHRS or MESL data portal. No monthly pesticide application reports were available in the MESL data portal for Camp Dwyer and vicinity.

10.4.1 Short-term and Long-term health risks:

Not evaluated. No data to evaluate.

10.5 Asbestos

No specific hazard sources were documented in the DOEHRS or MESL from 01 January 2015 through 31 December 2015.

10.6 Lead-Based Paint

No specific hazard sources were documented in the DOEHRS or MESL from 01 January 2015 through 31 December 2015.

10.7 Burn Pit

There were no operating burn pits at Camp Dwyer. No samples near/adjacent to any operating burn pits were provided for analysis. While not specific to Camp Dwyer and vicinity, the consolidated epidemiological and environmental sampling and studies on burn pits that have been conducted as of the date of this publication have been unable to determine whether an association does or does not exist between exposures to emissions from the burn pits and long-term health effects (Reference 10). The Institute of Medicine committee's (Reference 11) review of the literature and the data suggests that service in Iraq or Afghanistan (i.e., a broader consideration of air pollution than exposure only to burn pit emissions) may be associated with long-term health effects, particularly in susceptible (e.g., those who have asthma) or highly exposed subpopulations, such as those who worked at the burn pit. Such health effects would be due mainly to high ambient concentrations of PM from both natural and anthropogenic sources, including military sources. If that broader exposure to air pollution turns out to be relevant, potentially related health effects of concern are respiratory and cardiovascular effects and cancer. Susceptibility to the PM health effects could be exacerbated by other exposures, such as stress, smoking, local climatic conditions, and co-exposures to other chemicals that affect the same biologic or chemical processes. Individually, the chemicals measured at burn pit sites in the study were generally below concentrations of health concern for general populations in the United States. However, the possibility of exposure to mixtures of the chemicals raises the potential for health outcomes associated with cumulative exposure to combinations of the constituents of burn-pit emissions and emissions from other sources.

11 References[1]

1. Department of Defense. 2006. Department of Defense Instruction (DoDI) 6490.03, *Deployment Health.* Defense Occupational and Environmental Health Readiness System (referred to as the DOEHRS-EH database) at https://doehrs-ih.csd.disa.mil/Doehrs/.

2. Department of Defense. 2008 2017. Ch 1. DoDI6055.05, *Occupational and Environmental Health.*

3. Joint Chiefs of Staff. 2012. Joint Staff Memorandum (MCM) 0017-12*, Procedures for Deployment Health Surveillance.*

4. U.S. Army Public Health Command. June 2013 Revision. Technical Guide 230, *Environmental Health Risk Assessment and Chemical Exposure Guidelines for Deployed Military Personnel.*

5. Department of Defense. DoD MESL Data Portal, https://aphc-mesl.amedd.army.mil/mesl/. Some of the data and reports used may be classified or otherwise have some restricted distribution. (Accessed August 2017).

6. U.S. Central Command. 2013. Modification 12 to United States Central Command Individual Protection and Individual Unit Deployment Policy, 02 December 2012.

7. Center for Disease Control and Prevention (CDC). 2012. Imported Human Rabies in a U.S. Army Soldier. *Morbidity and Mortality Weekly Report,* 61(17):302-305.

8. Armed Forces Pest Management Board: https://www..acq.osd.mil/ele/afpmb/docs/lhd/venomous animals by country.pdf. U.S. Army Garrison – Forest Glen, Silver Spring, MD.

9. University of Adelaide, Australia. Clinical Toxinology Resources. https://www.toxinology.com/ (Accessed August 2017).

10. Goldman RF. Ch1: Introduction to heat-related problems in military operations. *In*: Textbook of Military Medicine: Medical Aspects of Harsh Environments (Vol. 1) Bordon Institute, Office of the Surgeon General, Department of the Army, Washington, DC. 2001. (Accessed August 2017).

[1] NOTE. The data are currently assessed using the USAPHC TG 230, 2013. The general method involves an initial review of the data which eliminates all chemical substances not detected above 1-yr negligible MEGs. Those substances screened out are not considered acute or chronic health hazards so are not assessed further. For remaining substances, acute and chronic health effects are evaluated separately for air water (soil is only evaluated for long-term risk). This is performed by deriving separate short-term and long-term population exposure level and estimates (referred to as PEPC) that are compared to MEGs derived for similar exposure durations. If less than or equal to negligible MEG the risk is Low. If levels are higher than negligible then there is a chemical-specific toxicity and exposure evaluation by appropriate SMEs, which includes comparison to any available marginal, critical or catastrophic MEGs. For drinking water 15-L/day MEGs are used for the screening while site specific 5-15-L/day are used for more detailed assessment. For nondrinking water (such as that used for personal hygiene or cooking) the 'consumption rate' is limited to 2 L/day (similar to the EPA), which is derived by multiplying the 5-L/day MEG by a factor of 2.5. This value is used to conservatively assess non drinking uses of water.

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

12 Where Do I Get More Information?

If a provider feels that the Service member's or Veteran's current medical condition may be attributed to specific OEH exposures at this deployment location, he/she can contact the Service-specific organization below. Organizations external to DoD should contact Deputy Assistant Secretary of Defense for Health Readiness Policy and Oversight (HRP&O).
Army Public Health Center Phone: (800) 222-9698. http://phc.amedd.army.mil/
Navy and Marine Corps Public Health Center (NMCPHC) (formerly NEHC) Phone: (757) 953-0700. 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, Deputy Assistant Secretary of Defense for Health Readiness Policy and Oversight (HRP&O) Phone: (800) 497-6261. http://fhpr.dhhq.health.mil/home.aspx