Military Deployment
Periodic Occupational and Environmental Monitoring Summary (POEMS):
FOB Gamberi and vicinity , Afghanistan
Calendar Years: 2016-2018

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 1-4).

PURPOSE: This POEMS documents the Department of Defense (DoD) assessment of occupational and environmental health (OEH) risk for Forward Operating Base (FOB) Gamberi and vicinity that includes: Command Outpost (COP) Najil, FOB Gamberi, FOB Mehtar Lam, FOB Xio Haq, FOB Manjan and Alingar. It presents a qualitative summary of OEH risks identified at these locations and their potential medical implications. The report is based on information collected from 01 January 2016 through 31 December 2018 to include deployment OEH surveillance sampling and monitoring data (e.g., air, water, and soil), field investigation and health assessment reports, as well as country and area-specific information on endemic diseases. While FOB Manjan is included in this POEMS due to its location in the Laghman Province and proximity to the other sites listed, there was no specific site information available for this FOB. In addition, no sampling or surveys were available in the Defense Occupational and Environmental Health Readiness System (DOEHRS) for calendar years 2016-2018 for Command Outpost (COP) Najil, FOB Mehtar Lam, FOB Xio Haq, or Alingar as discussed in further detail below. Therefore, this assessment focuses predominately on FOB Gamberi (Reference 1).

This assessment assumes that environmental sampling at FOB Gamberi 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 2016 to 31 December 2018.

The POEMS can be useful to inform healthcare providers and others of environmental conditions experienced by individuals deployed to FOB Gamberi 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:

All six locations included in this document are located within the Laghman province of Afghanistan in the eastern part of the country. The majority of the province is mountainous with intensively cultivated land along river valleys and forested areas.

FOB Gamberi: FOB Gamberi is located within the Gamberi Desert and surrounded on all sides by mountains. The area has little to no population and no natural waterways or vegetation. Soil in the surrounding area was mostly sand or fine gravel; however, most of FOB Gamberi was covered with course gravel which provided some dust abatement. FOB Gamberi's primary mission was to support the 201st Corps. Facilities included: a helicopter landing zone (HLZ), dining facility, fuel storage and distribution center, motor pool, medical facility, incinerator, generators and a cantonment area. Samples were taken in 2016, 2017 and 2018 at FOB Gamberi and the latest occupational and environmental health site assessment (OEHSA) was completed 5 September 2018 (Reference 1).

Base Camp Xio Haq: Camp Xio Haq was mainly pasture land surrounded by mountains. The soil was composed of silty sand with packed gravel underneath. The facility was used as a military staging area and fuel point and housed generators, a motor pool and a JP-8 fueling facility. Based on available information, Base Camp Xio Haq was not active in calendar years 2016-2018. The last sample recorded in the DOEHRS was in 2013 and the last OEHSA was in 2013.

FOB Mehtar Lam: FOB Mehtar Lam was located in a rural mountainous region of the Laghman province. The FOB was used as a mission staging area and also used to support vehicle maintenance and fueling, life support needs, solid waste and waste water disposal. When in use, there were semi-permanent and permanent structures at the camp. The roads on the base were packed gravel/dirt. The site was historically used as a US Military FOB but was transferred back to Afghan National Army control around 2014. There was no information available for FOB Mehtar Lam in calendar years 2016-2018. The last sample recorded in the DOEHRS was in 2014 and the last OEHSA was in 2013.

COP Najil: COP Najil was located in a mountain valley overlooking the Darya-Yeahsaan River. The COP was situated on the steep sloping terrain trending from the highest point (south) to the lowest point (north). There was little vegetation located on COP Najil and the area was dry and sandy. The mission of Najil was to provide force protection for the northern reaches of the Laghman Province. There was a motor pool, diesel generators and a cantonment area located on the COP. There was no information available for COP Najil in calendar years 2016-2018. The last sample recorded in the DOEHRS was in 2009 and the last OEHSA was in 2012.

Camp Alingar: Camp Alingar was located approximately 27 km from Mehtarlam which is the capital of the Laghman Province. It bordered the Alishing and Dawlat Shah Districts to the West, Nuristan Province to the North, Kunar and Nangarhar provinces to the East and Qarghayi and Mihtarlam districts to the South. There was no information available for Camp Alingar in calendar years 2016-2018. The last sample recorded in the DOEHRS was in 2012 and there was no OEHSA on record.

There was no specific camp information available for Camp Manjan in DOEHRS. No unclassified internet searches yielded any additional information on this location.

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

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

Short-term health risks & medical implications:

The following hazards may be associated with potential acute health effects in some personnel during deployment at FOB Gamberi and vicinity that includes FOB Gamberi, FOB Mehtar Lam, FOB Xio Haq, COP Najil, Camp Manjan and FOB Alingar:

For heat stress, risk can be greater during months of May through September, and greater for susceptible persons including those older than 45, of low fitness level, unacclimatized, or with underlying medical conditions, 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.

Air quality: For inhalable coarse particulate matter less than 10 micrometers in diameter (PM_{10}) from environmental dust (including incinerators, or burn pits/barrels which may have existed), the PM_{10} overall short-term health risk was not evaluated due to no data for analysis. For inhalable fine particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$) from environmental dust (including incinerators, or burn pits/barrels which may have existed), the $PM_{2.5}$ overall short-term health risk was 'Low.' However, the FOB Gamberi and vicinity area is a dust-prone desert environment, with a semi-arid climate, also subject to vehicle traffic. Consequently, exposures to PM_{10} and $PM_{2.5}$ may vary, as conditions may vary, and 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, 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. Records indicate burn barrels were utilized in the past on FOB Gamberi but are no longer operational. Burn pits (and/or incinerators or burn barrels) also might have existed in the vicinity (for example, used by the local population). The PM_{10} and the $PM_{2.5}$ overall short-term health risks specifically for burn pits (and/or incinerators or burn barrels) were not evaluated due to no environmental samples collected and provided for analysis– see Section 10.7. Where incinerators and burn pits/barrels exist, exposures may vary, and exposures to high levels of PM_{10} and $PM_{2.5}$ from smoke may 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. Although most short-term health effects from exposure to particulate matter and incinerator and/or burn pit/barrel smoke should have resolved post-deployment, providers should be prepared to consider the relationship between deployment exposures and current complaints. Some individuals may have sought treatment for acute respiratory irritation while at FOB Gamberi and vicinity. Personnel who reported with symptoms or required treatment while at site(s) with burn pit activity should have exposure and treatment noted in medical record (e.g., electronic medical record and/or on a Standard Form (SF) 600 (*Chronological Record of Medical Care*).

Long-term health risks & medical implications:

The following hazards may be associated with potential chronic health effects in some personnel during deployment at FOB Gamberi and vicinity that includes FOB Gamberi, FOB Mehtar Lam, FOB Xio Haq, COP Najil, Camp Manjan and FOB Alingar::

Air quality: For inhalable fine particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$) from environmental dust (including incinerators, or burn pits/barrels which may have existed), the overall long-term health risk was 'Low.' Inhalable coarse particulate matter less than 10 micrometers in diameter (PM_{10}) from environmental dust (including incinerators, or burn pits/barrels which may have existed) was not evaluated for long-term health risk due to no data for analysis and no available health guidelines. However, the FOB Gamberi and vicinity area is a dust-prone desert environment with a semi-arid climate, also subject to vehicle traffic, and conditions may have varied. Records indicate burn barrels were utilized in the past on FOB Gamberi but are no longer operational. Burn pits (and/or incinerators or burn barrels) also might have existed in the vicinity (for example, used by the local population). The PM_{10} and the $PM_{2.5}$ overall long-term health risks specifically for burn pits (and/or incinerators or burn barrels) were not evaluated due to no environmental samples collected and provided for analysis– see Section 10.7. Where burn pits/barrels (and/or incinerators) might have existed, exposures may vary, as conditions may have varied. For inhalational exposure to high levels of dust containing PM_{10} and $PM_{2.5}$, such as during high winds or dust storms, and for exposures to incinerator and/or burn pit smoke, 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 particulate matter exposures and exposures to burn pits/barrels (and/or incinerators) 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 – Forward Operating Base (FOB) Gamberi and vicinity that includes Command Outpost (COP) Najil, FOB Gamberi, FOB Mehtar Lam, FOB Xio Haq, FOB Manjan and Alingar [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 were available for analysis to characterize the short-term health risk. Daily levels vary, acute health effects (e.g., upper respiratory tract irritation) are more pronounced during days with elevated PM levels. 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 were available for analysis to characterize the short-term health risk. Daily levels vary, acute health effects (e.g., upper respiratory tract irritation) are more pronounced during days with elevated PM levels. More serious effects are possible in susceptible persons (e.g., those with asthma/pre-existing respiratory diseases).
	Long-term: No data nor health guidelines		Long-term: No data nor health guidelines
Particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$)	Short-term: The short-term health risk is Low for all pathways. Daily levels vary and are expected to have little or no impact on accomplishing the mission. Because FOB Gamberi is situated in a dusty semi-arid environment, a majority of the time mild acute (short-term) health effects are anticipated; certain peak or elevated 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.	Limiting strenuous physical activities when air quality is especially poor; taking actions such as closing tent flaps, windows, and doors.	Short-term: The short-term health risk is Low for all pathways. Daily levels vary and are expected to have little or no impact on accomplishing the mission. Because FOB Gamberi is situated in a dusty semi-arid environment, a majority of the time mild acute (short-term) health effects are anticipated; certain peak or elevated 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: The long-term health risk is Low. A Low health risk level suggests that long-term exposure to $PM_{2.5}$ is expected to have no specific medical actions required. 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: The long-term health risk is Low. A Low health risk level suggests that long-term exposure to $PM_{2.5}$ is expected to have no specific medical actions required. 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).
Metals	Short-term: Not an identified source of health risk based on the available data. No parameters exceeded their 1-year Negligible MEGs.		Short-term: Not an identified source of health risk based on the available data. No parameters exceeded their 1-year Negligible MEGs.
	Long-term: Not an identified source of health risk based on the available data. No parameters exceeded their 1-year Negligible MEGs.		Long-term: Not an identified source of health risk based on the available data. No parameters exceeded their 1-year Negligible MEGs.
Volatile Organic Compounds (VOC)	Short-term: Not an identified source of health risk based on the available data. No parameters were above their short-term MEGs.		Short-term: Not an identified source of health risk based on the available data. No parameters were above their short-term MEGs.

Source of Identified Health Risk[3]	Unmitigated Health Risk Estimate[4]	Control Measures Implemented	Residual Health Risk Estimate[4]
	Long-term: Acrolein was the only VOC above the long term 1 year Negligible MEG, but it was only detected in one sample and was therefore not assessed for chronic exposure.		Long-term: Acrolein was the only VOC above the long term 1 year Negligible MEG, but it was only detected in one sample and was therefore not assessed for chronic exposure.
Military Unique			
Ionizing Radiation	Short-term: Low. There is a mobile vehicle and cargo inspection system (VACIS) which utilizes cobalt - 60. Personnel at risk have film badges and are trained on the basics of radiation and safety and exposure is minimal.		Short-term: Low. There is a mobile vehicle and cargo inspection system (VACIS) which utilizes cobalt -60. Personnel at risk have film badges and are trained on the basics of radiation and safety and exposure is minimal.
	Long-term: Low. There is a mobile vehicle and cargo inspection system (VACIS) which utilizes cobalt -60. Personnel at risk have film badges and are trained on the basics of radiation and safety and exposure is minimal.		Long-term: Low. There is a mobile vehicle and cargo inspection system (VACIS) which utilizes cobalt -60. Personnel at risk have film badges and are trained on the basics of radiation and safety and exposure is minimal.
VENOMOUS ANIMAL/ INSECTS			
Snakes, scorpions, and spiders	Short-term: Low; If encountered, effects of venom vary with species from mild localized swelling (e.g., *Scorpiops lindbergi*) to potentially lethal effects (e.g. *Gloydius halys*).	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., *Scorpiops lindbergi*) to potentially lethal effects (e.g. *Gloydius halys*).
	Long-term: None identified		Long-term: None identified
HEAT/COLD STRESS			
Heat	Short-term: Variable; Risk of heat injury is High for June-September, Moderate in May 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 High for June-September, Moderate in May and Low for all other months.
	Long-term: Low, The long-term risk was Low. However, the risk may be greater to certain susceptible persons– those older (i.e., greater than 45 years), in lesser physical shape, or with underlying medical/health conditions.		Long-term: Low, The long-term risk is Low. However, the risk may be greater to certain susceptible persons– those older (i.e., greater than 45 years), in lesser physical shape, or with underlying medical/health conditions.
Cold	Short-term: Low risk of cold stress/injury.	Risks from cold stress reduced with protective measures such as use of the buddy system, limiting exposure during cold weather, proper hydration and nutrition, and proper wear of issued protective clothing.	Short-term: Low risk of cold stress/injury.
	Long-term: Low; Long-term health implications from cold injuries are rare but can occur, especially from more serious injuries such as frost bite.		Long-term: Low; Long-term health implications from cold injuries are rare but can occur, especially from more serious injuries such as frost bite.
Unique Incidents/			

Source of Identified Health Risk[3]	Unmitigated Health Risk Estimate[4]	Control Measures Implemented	Residual Health Risk Estimate[4]
Concerns			
Pesticides/Pest Control	Short-term: Low	See Section 10.4	Short-term: Low
	Long-term: Low		Long-term: Low
Burn Pits	Short-term: OEHSA records indicate burn barrels were utilized in the past on FOB Gamberi but are no longer operational. Consequently, the PM_{10} and the $PM_{2.5}$ overall short-term health risks specifically for burn pits were not evaluated – see Section 10.7. Burn pits/barrels and/or incinerators might have existed in the vicinity outside the fence line (for example, burn pits used by the local population). If burn pits were operational exposure to burn pit smoke is variable. Exposure to high levels of PM_{10} and $PM_{2.5}$ from smoke may 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.	Risks reduced by limiting strenuous physical activities when air quality was especially poor; and action such as closing tent flaps, windows, and doors. Other control measures included locating burn pits downwind of camps, increased distance from troop populations, and improved waste segregation and management techniques.	Short-term: OEHSA records indicate burn barrels were utilized in the past on FOB Gamberi but are no longer operational. Consequently, the PM_{10} and the $PM_{2.5}$ overall short-term health risks specifically for burn pits were not evaluated – see Section 10.7. Burn pits/barrels and/or incinerators might have existed in the vicinity outside the fence line (for example, burn pits used by the local population). If burn pits were operational exposure to burn pit smoke is variable. Exposure to high levels of PM_{10} and $PM_{2.5}$ from smoke may 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.
	Long-term: OEHSA records indicate burn barrels were utilized in the past on FOB Gamberi but are no longer operational. Consequently, the PM_{10} and the $PM_{2.5}$ overall long-term health risks specifically for burn pits were not evaluated – see Section 10.7. Burn pits/barrels and/or incinerators might have existed in the vicinity or outside the fence line (for example, burn pits used by the local population). Exposure to burn pit smoke is variable. Exposure to high levels of PM_{10} and $PM_{2.5}$ in the smoke may be associated with some otherwise healthy personnel, who were exposed for a long-term period, possibly developing 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.		Long-term: OEHSA records indicate burn barrels were utilized in the past on FOB Gamberi but are no longer operational. Consequently, the PM_{10} and the $PM_{2.5}$ overall long-term health risks specifically for burn pits were not evaluated – see Section 10.7. Burn pits/barrels and/or incinerators might have existed in the vicinity or outside the fence line (for example, burn pits used by the local population). Exposure to burn pit smoke is variable. Exposure to high levels of PM_{10} and $PM_{2.5}$ in the smoke may be associated with some otherwise healthy personnel, who were exposed for a long-term period, possibly developing 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.

[1]This Summary Table provides a qualitative estimate of population-based short- and long-term health risks associated with the occupational environment conditions at FOB Gamberi and vicinity that includes Command Outpost (COP) Najil, FOB Gamberi, FOB Mehtar Lam, FOB Xio Haq, FOB Manjan and Alingar. FOB Gamberi was the only facility that had sampling information available for the timeframe of this POEMS. 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 1 January 2016 through 31 December 2018. 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 FOB Gamberi and vicinity. The health risks are presented as Low, Moderate, High or Extremely High for both acute and chronic health effects. The health risk level is based on an assessment of both the potential severity of the health effects that could be caused and probability of the exposure that would produce such health effects. Details can be obtained from the Army Public Health Center (APHC). Where applicable, "None Identified" is used when 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 FOB Gamberi 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 U.S. Army Public Health Center (USAPHC) Technical Guide 230, *Environmental Health Risk Assessment and Chemical Exposure Guidelines for Deployed Military Personnel* (Reference 5). All OEH risk estimates represent residual risk after accounting for preventive controls in place. Occupational exposures and exposures to endemic diseases are greatly reduced by preventive measures. For environmental exposures related to airborne dust, there are limited preventive measures available, and available measures have little efficacy in reducing exposure to ambient conditions.

2 Air

2.1 Site-Specific Sources Identified

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

Air pollution sources identified at FOB Gamberi included generators, an incinerator, and a HLZ. Generators were kept outside and away from buildings and emissions from these units were likely to impact only those in close proximity. The PC-400 incinerator was used for paper and classified material. It ran approximately two times per week and was of concern due to its close proximity (20 feet) from office spaces. Dust was prevalent around the HLZ during take-offs and landings from the helicopter rotors but t-walls surround the HLZ and kept some particulate from the downwind portion of the camp. There is mention in a 2014 OEHSAs of burn barrels that were located in the northwest corner of FOB Gamberi. These burn barrels were found during an inspection in 2014 but it was uncertain if the content of the barrels were burned. OEHSAs conducted in 2016-2018 indicated that there were no active burn barrels or burn pits. The prevailing winds are to the North at FOB Gamberi.

Information available in DOEHRS showed no indication that Command Outpost (COP) Najil, FOB Mehtar Lam, FOB Xio Haq, FOB Manjan and Alingar were operational in calendar years 2016-2018. Therefore, there were no site-specific sources of air pollution identified for this time frame.

2.2 Particulate matter

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

2.3 Particulate matter, less than10 micrometers (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} air samples for any of the locations were available for analysis.

2.3.3 Short-term health risks:

Not evaluated.

2.3.4 Long-term health risk:

Not Evaluated-no data nor 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 *micrometers* ($PM_{2.5}$)

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 (1year) $PM_{2.5}$ MEGs (µg/m^3):

- Negligible MEG = 15
- Marginal MEG = 65.

2.4.2 Sample data/Notes:

Samples were only collected at FOB Gamberi. All samples were assessed as general ambient air to which the entire base population may have been exposed. However, in addition to looking at the ambient air, two additional sample locations were considered. As requested by preventive medicine personnel in the field the samples collected in the vicinity of the HLZ and the incinerator were evaluated separately from the rest of the samples to determine if there was additional risk to sub populations working near these sources.

For the ambient air pathway a total of 11 valid $PM_{2.5}$ air samples were collected from 8 February 2016 to 9 September 2018. The range of 24-hour $PM_{2.5}$ concentrations was 42 µg/m^3 – 259 µg/m^3 with an average concentration of 72 µg/m^3.

For the air samples taken near HLZ only one sample was collected on 8 February 2016. The 24-hour $PM_{2.5}$ concentration was 79 µg/m^3.

For the air samples taken near the incinerator a total of 4 valid $PM_{2.5}$ air samples were collected from 19 May 2017 to 6 November 2017. The range of 24-hour $PM_{2.5}$ concentrations was 42 µg/m^3 – 259 µg/m^3 with an average concentration of 103 µg/m^3.

2.4.3 Short-term health risks:

Low: The short-term $PM_{2.5}$ health risk assessment was Low for the ambient air, as well as those working in the vicinity of the HLZ and the incinerator based on average and peak $PM_{2.5}$ sample concentrations, and the likelihood of exposure at these hazard severity levels. A Low health risk assessment is expected to have little to no impact on accomplishing the mission (Reference 5, Table 3-2). Confidence in the short-term $PM_{2.5}$ health risk assessment was low due to the limited number of samples (Reference 5, Table 3-6). Additionally, there was no indication from the available data that there was a significant increase in $PM_{2.5}$ exposure for special populations working near either the HLZ or the incinerator. One sample taken near the incinerator had a significantly higher $PM_{2.5}$ measurement (259 µg/m^3) but the other three samples were in range with the other ambient air samples taken at FOB Gamberi.

For the highest $PM_{2.5}$ concentration (259 µg/m^3), the hazard severity was marginal. During peak exposures at the marginal hazard severity level, a majority of personnel will experience notable eye, nose, and throat irritation and some respiratory effects. Some lost-duty days are expected. Significant aerobic activity will increase risk. Those with a history of asthma or cardiopulmonary diseases are expected to experience increased symptoms. Based on the one available $PM_{2.5}$ sample collected in the vicinity of the HLZ (79 µg/m^3), the hazard severity was negligible. During peak exposures at the negligible hazard severity level, a few personnel may experience notable mild eye, nose, or throat irritation; most personnel will experience only mild effects. Service Members with pre-existing health conditions (e.g., asthma, or cardiopulmonary diseases) may have experienced an exacerbation of their conditions. The hazard probability was negligible (Reference 5, Table 3-11)

2.4.4 Long-term health risks:

Low: The long-term health risk assessment was Low for exposure to the ambient air based on the average $PM_{2.5}$ concentration (72 µg/m^3), and the likelihood of exposure at this hazard severity level. A Low health risk level suggests that long-term exposure to $PM_{2.5}$ is expected to have no specific medical actions required (Reference 5, Table 3-3). Confidence in the long-term $PM_{2.5}$ health risk assessment was low based on the limited amount of data. For example, no samples were taken during the winter months and therefore a full years' worth of exposure was not represented in the available data. There was not enough data available to assess any additional long-term health risk for personnel working in the vicinity of the HLZ or incinerator (Reference 5, Table 3-6).

The hazard severity was marginal for average $PM_{2.5}$ sample concentrations for the ambient air. The results suggest that with repeated exposures above the marginal threshold, development of chronic health conditions such as reduced lung function or exacerbated chronic bronchitis, chronic obstructive pulmonary disease (COPD), asthma, atherosclerosis, or other cardiopulmonary diseases could occur in generally healthy troops. Those with a history of asthma or cardiopulmonary disease are considered to be at particular risk. This guideline is an uncertain screening value - it is not a known health effect concentration. The hazard probability for the ambient air was seldom (Reference 5, Table 3-12).

2.5 Airborne Metals

2.5.1 Sample data/Notes:

A total of 11 valid $PM_{2.5}$ airborne metal samples were collected at FOB Gamberi from 8 February 2016 to 9 September 2018.

2.5.2 Short and Long-term health risks:

None identified based on the available sampling data. No parameters exceeded their 1-year Negligible MEGs

2.6 Volatile Organic Compounds (VOC)

2.6.1 Exposure Guidelines:

Short-Term Acrolein MEGs (µg/m^3):
- 1 hour Critical MEG = 3200
- 1 hour Marginal MEG = 230
- 1 hour Negligible MEG = 70
- 8 hour Negligible MEG = 70
- 14 day Negligible MEG = 45.9

Long-term Acrolein MEGs (µg/m^3):
- 1 year Negligible MEG = 0.137

2.6.2 Sample data/Notes:

The health risk assessment is based on average and peak concentration of valid volatile organic chemical (VOC) air samples collected from 8 February 2016 to 23 August 2017, and the likelihood of exposure.

2.6.3 Short-term health risks:

None identified based on the available sampling data. No VOC concentrations were above their short-term MEGs.

2.6.3 Long-term health risks:

Not evaluated. Acrolein was the only VOC above the long term 1 year Negligible MEG, but it was only detected in one sample (concentration 1.6 µg/m^3) and was therefore not assessed for chronic exposure.

3 Soil

3.1 Site-Specific Sources Identified

3.2 Sample data/Notes:

A total of three valid surface soil samples were collected on 13 July 2016, to assess OEH health risk to deployed personnel. 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.

3.3 Short-term health risk:

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

3.4 Long-term health risk:

None identified based on the available sampling data. No parameters exceeded 1-year Negligible MEGs.

4 Water

In order to assess the health risk to U.S. personnel from exposure to water in theater, the APHC identified the most probable exposure pathways. These are based on the administrative information provided on the field data sheets (FDS) submitted with the samples taken over the time period being evaluated. There were six untreated water samples taken between 12 July 2016 and 25 July 2018. Based on the FDSs all samples for untreated water were associated with source water for treatment purposes and not consumption. Therefore, untreated samples are not assessed as potential ingestion health hazards. Some of the water was used for personnel hygiene but not for brushing teeth. None of the samples had concentrations above the non-drinking water MEGs. Field data sheets indicated 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

The 2016 and 2017 OEHSAs indicated that there were three bottled water brands, Aria®, Cristal® and Kinley® used at FOB Gamberi. However, there were no bottled water samples available to evaluate (Reference 1). Identification of a trademarked product does not imply endorsement by the Army.

4.1.2 Short-term and long-term health risk:

No available sample data to determine a health risk.

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:

There was one non-drinking treated water sample available for FOB Gamberi. The sample was collected from the tap at the Reverse Osmosis Water Purification Unit (ROWPU). The water is used for personnel hygiene and cleaning kitchen equipment. There were not enough samples to conduct a risk assessment, however all chemicals were below their corresponding 1-year negligible MEGs.

4.3.3 Short and long-term health risks:

Not enough available sample data to determine a health risk.

5 Military Unique

5.1 Chemical Biological, Radiological Nuclear (CBRN) Weapons

No specific hazard sources were documented in the DOEHRS from 1 January 2016 to 31 December 2018 (Reference 1).

5.2 Depleted Uranium (DU)

No specific hazard sources were documented in the DOEHRS from 1 January 2016 to 31 December 2018 (Reference 1).

5.3 Ionizing Radiation

FOB Gamberi had a mobile vehicle and cargo inspection system (VACIS). Its x-ray imaging and radiation scanning help security personnel intercept weapons and other contraband and utilizes cobalt - 60. Only personnel who are assigned to the entry control point (ECP) have the potential to be exposed. Personnel at risk have film badges and are trained on the basics of radiation and safety and exposure is minimal. (Reference 1).

5.4 Non-Ionizing Radiation

No specific hazard sources were documented in the DOEHRS from 1 January 2016 to 31 December 2018 (References 1).

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 POEMS. Information on the relevant diseases in Afghanistan was pulled from the Center for Disease Control and Prevention (Reference 7). Additionally, some information was found under the disease threats section in the OEHSA. Information from the OEHSA is summarized in the table below. It was not specified in the OEHSA how the risk estimate was obtained (Reference 1).

Table _. Disease Threat Assessment in OEHSA

Disease Threat	Hazard Severity	Hazard Probability	Risk Estimate
Crimean-Congo Hemorrhagic Fever	Catastrophic	Unlikely	Moderate
West Nile Fever	Marginal	Unlikely	Low
Leishmaniasis (Cutaneous)	Negligible	Unlikely	Low
Leishmaniasis (Visceral)	Critical	Unlikely	Low
Q-Fever	Marginal	Unlikely	Low
Leptospirosis	Marginal	Unlikely	Low
Typhus	Marginal	Unlikely	Low
Rabies	Catastrophic	Seldom	High
Malaria	Marginal	Seldom	Low

6.1 Foodborne 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 disease surveillance has been improved to cover the majority of the country since 2009. There is still underreporting of specific disease incidence.

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)

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.

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

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.

6.1.3 Polio

The polio virus 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.

6.2 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 likely 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 likely included the use of pesticides, reduction of pest/breeding habitats, and engineering controls.

6.2.1 Malaria

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

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

6.2.3 Crimean-Congo hemorrhagic fever

Crimean-Congo hemorrhagic fever 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

Sandfly fever is transmitted by sandflies and occurs more commonly in children though adults are still at risk. Sandfly fever disease typically would result in debilitating febrile illness requiring 1 to 7 days of supportive care followed by return to duty.

6.2.5 Plague

Outbreaks of human plague are rare and typically occur in crowded urban settings associated with large increases in infected commensal rats (*Rattus rattus*) and their flea populations. Some untreated cases of bubonic plague may develop into secondary pneumonic plague. Respiratory transmission of pneumonic plague is rare but has the potential to cause significant outbreaks. Close contact is usually required for transmission. In situations where respiratory transmission of plague is suspected, weaponized agent must be considered. Extremely rare cases (less than 0.01% per month attack rate) could occur. Incidence could result in potentially severe illness which may require more than 7 days of hospitalization and convalescence.

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

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

6.2.7 West nile fever

West Nile fever 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.

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 likely in place and included avoiding water contact and recreational water activities, proper wear of uniform (especially footwear), and protective coverings for cuts/abraded skin.

6.4 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, measles, 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 likely in place and included routine medical screenings, vaccination, enforcing minimum space allocation in housing units, implementing head-to-toe sleeping in crowded housing units, implementation of proper personal protective equipment (PPE) when necessary for healthcare providers and detention facility personnel.

6.4.1 Tuberculosis (TB)

Tuberculosis 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 can include active case isolation in negative pressure rooms, where available.

6.4.2 Meningococcal meningitis

Meningococcal meningitis is potentially a very severe disease typically requiring intensive care; fatalities may occur in 5-15% of cases.

6.5 Animal-Contact Diseases

6.5.1 Rabies

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. The vast majority (>99%) of persons who develop rabies disease will do so within a year after a risk exposure; however, there have been rare reports of individuals presenting with rabies disease up to six years or more after their last known risk exposure. Mitigation strategies included reduction of animal habitats, active pest management programs, and timely treatment of feral animal scratches/bites.

6.5.2 Anthrax

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 can include 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

Q-fever is 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.

6.5.4 Avian influenza

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

6.6 Soil-transmitted helminths (hookworm, strongyloidiasis, cutaneous larva migrans)

Soil-transmitted helminths (hookworm, strongyloidiasis, cutaneous larva migrans) can occur in a small number of cases (less than 1% per month attack rate among personnel with direct skin exposure to soil contaminated with human or animal feces (including sleeping on bare ground, walking barefoot)). Initial skin symptoms typically are mild and are not debilitating. However, systemic symptoms of fever, cough, abdominal pain, nausea, and diarrhea may develop weeks to months after initial infection with hookworm or *Strongyloides* spp. More severe infections with high worm burden may be debilitating in some cases. Rates of infection in U.S. personnel will be highly variable, depending on specific local environmental conditions. Rates of infection in U.S. personnel are expected to be less than 1 percent per month in most locations. However, rates in some focal areas with heavily contaminated soil could exceed 1 percent per month.

7 Venomous Animals

All information was taken directly from the Armed Forces Pest Management Board (Reference 9) and the Clinical Toxinology Resources web site from the University of Adelaide, Australia (Reference 10). The species listed below have home ranges that overlap the location of FOB Gamberi and vicinity, and may present a health risk if they are encountered by personnel. See Section 9 for more information about pesticides and pest control measures.

7.1 Spiders

- *Latrodectus dahlia* (widow spider): Severe envenoming possible, potentially lethal. However,

venom effects are mostly minor and even significant envenoming is unlikely to be lethal.

7.2 Scorpions

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

- *Mesobuthus caucasicus, Mesobuthus eupeus, Mesobuthus macmahoni, Orthochirus afghanus, Orthochirus jalalabadensis, Orthochirus pallidus and Orthochirus samrchelsis*. There are a number of dangerous Buthid scorpions, but there are also some known to cause minimal effects. Without clinical data it is unclear where these species fit within that spectrum.

- *Hottentotta alticola*, and *Hottentotta saulcyi*: Moderate envenoming possible but unlikely to prove lethal. Stings by these scorpions are likely to cause only short lived local effects, such as pain, without systemic effects.

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

7.3 Snakes

- *Gloydius halys* (Haly's pit viper): Severe envenoming possible, potentially lethal. Bites may cause moderate to severe coagulopathy and haemorrhagins causing extensive bleeding.

- *Macrovipera lebetina obtuse* (Levant blunt-nosed viper)*, and Macrovipera lebetina turanica* (Turan blunt-nosed viper): Severe envenoming possible, potentially lethal. Bites may cause mild to severe local effects, shock & coagulopathy.

- *Naja oxiana* (Oxus cobra): Severe envenoming possible, potentially lethal. Bites can cause systemic effects, principally flaccid paralysis.

7.4 Short-term health risk:

Low: If encountered, effects of venom vary with species from mild localized swelling (e.g. widow spider) to potentially lethal effects (e.g., Haly's pit viper). See effects of venom above. Mitigation strategies included avoiding contact, proper wear of uniform (especially footwear), and timely medical treatment. Confidence in the health risk estimate is low (Reference 5, 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 105 °F with an average temperature of 91 °F based on historical climatological data from the U.S. Air Force Combat Climatology Center, 14th Weather Squadron. The health risk of heat

stress/injury based on temperatures alone is Low (< 78 °F) from October - April, Moderate (78-81.9°F) in May, high (82-87.9°F) in September, and extremely high (≥ 88°F) from June- August. However, work intensity and clothing/equipment worn pose greater health risk of heat stress/injury than environmental factors alone (Reference 11). Managing risk of hot weather operations should include 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: Based on standard Army policy the risk of heat injury should have been reduced through preventive measures such as work/rest cycles, proper hydration and nutrition, and monitoring Wet Bulb Globe Temperature (WBGT). Risk of heat injury in unacclimatized or susceptible populations (older, previous history of heat injury, poor physical condition, underlying medical/health conditions), and those under operational constraints (equipment, PPE, vehicles) is High from June - September, Moderate in May, and Low from October- April. Confidence in the health risk estimate is low (Reference 5, 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 5, Table 3-6).

8.2 Cold

8.2.1 Short-term health risks:

Winter (November - March) mean daily minimum temperatures range from 38 °F to 63 °F with an average temperature of 47 °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 November – March. 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 11).

Low: The short-term health risk of cold injury is Low. Confidence in the health risk estimate is medium (Reference 5, Table 3-6).

8.1.2 Long-term health risk:

Low: The long-term health risk of cold injury is Low. Confidence in the health risk estimate is medium (Reference 5, Table 3-6).

9 Noise

9.1 Continuous

FOB Gamberi: Generators were a source of noise to personnel working in the vicinity. The noise level was determined to be 100 decibels at 10 meters away. T-walls surrounded the generators to suppress sound and the generators were located away from main walkways and living areas. The HLZ was also a source of noise to personnel working in the vicinity. The noise level was assessed at 85 decibels at a distance of 15 meters away. Operators wore PPE when working in close proximity to any aircraft. In addition, T-walls were built around the HLZ to block noise to the rest of the FOB.

9.1.1 Short and long-term health risks:

Not evaluated

9.2 Impulse

No specific hazard sources were documented in the DOEHRS from 1 January 2016 to 31 December 2018.

9.2.1 Short-term and long-term health risks:

Not evaluated.

10 Unique Incidents/Concerns

10.1 Potential environmental contamination sources

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

10.2 Waste Sites/Waste Disposal

At FOB Gamberi, all regulated medical waste and hazardous waste was transported to FOB Fenty or Bagram for disposal. Construction and residential waste was hauled off site for disposal. There was no know solid waste releases or spills during the timeframe of this POEMS.

10.3 Fuel/petroleum products/industrial chemical spills

No known product/industrial spills were reported in 2016-2018 for FOB Gamberi.

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 was performed using 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, 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. A total of 221 pesticide application reports for the date range of 1 January 2016 to 31 December 2018 were in the DOEHRS data portal for FOB Gamberi and list the usage of pesticides on the site. There were no pesticide reports for any of the other facilities covered by this POEMS

10.4.1 Rodenticides

Brodifacoum any pyrethrins were used to control rodents.

10.4.2 Insecticides

Insecticides were used to control ants, bees, crickets, fleas, flies, lice, mosquitoes, spiders, termites, and wasps included: *Abamectin B1, n,n-diethyl-m-toluamide (DEET), imidacloprid, hydramethylnon, pyrethrins, bacillus thuringiensis subspecies israelensis, bifenthrin*, b-cyfluthrin, fipronil, phenothrin, and sumithrin.

10.4.3 Short-term and Long-term health risks

Low: Confidence in this risk estimate was low to medium (Reference 5, Table 3-6).

10.5 Asbestos

No specific hazard sources were documented in the DOEHRS from 1 January 2016 through 31 December 2018 for asbestos.

10.6 Lead Based Paint

No specific hazard sources were documented in the DOEHRS from 1 January 2016 through 31 December 2018 for lead based paint.

10.7 Burn Pit

Historic OEHSA records indicate that burn barrels were utilized on FOB Gamberi in the past but were placed as far away from the sleeping and working areas as possible. OEHSA from 2016-2018 no longer indicate the use of burn barrels at FOB Gamberi.

One active burn pit was in use during 2016-2018 time period at FOB Mether Lam. No environmental samples were collected to categorize the risk from the exposure from this burn pit.

While not specific to FOB Gamberi 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 12). The Institute of Medicine committee's (Reference 12) 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. 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 (DoD) Instruction 6490.03, *Deployment Health*, 2006.

3. DoDI 6055.05, Occupational and Environmental Health, 2008.

4. Joint Staff Memorandum (MCM) 0017-12, Procedures for Deployment Health Surveillance, 2012.

5. USAPHC TG230, June 2013 Revision.

6. Modification 12 to United States Central Command Individual Protection and Individual Unit Deployment Policy, 2 December 2013.

7. CDC. 2012. Morbidity and Mortality Weekly Report. Imported Human Rabies in a U.S. Army Soldier. May 4, 2012. 61(17); 302-305.

8. Health Information for Travelers to Afghansitan, Clinician View: https://wwwnc.cdc.gov/travel/destinations/clinician/none/afghanistan, Center for Disease Control and Prevention, accessed 2 April 2019

9. Armed Forces Pest Management Board: http://www.afpmb.org/content/venomous-animals-country#Afghanistan. U.S. Army Garrison - Forest Glen, Silver Spring, MD.

10. Clinical Toxinology Resources: http://www.toxinology.com/. University of Adelaide, Australia.

11. Goldman RF. 2001. Introduction to heat-related problems in military operations. *In*: Textbook of military medicine: medical aspects of harsh environments Vol. 1, Pandolf KB, and Burr RE (Eds.), Office of the Surgeon General, Department of the Army, Washington DC.

12. IOM (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) Phone: (757) 953-0700. http://www.med.navy.mil/sites/nmcphc/Pages/Home.aspx
U.S. Air Force School of Aerospace Medicine (USAFSAM) Phone: (888) 232-3764. http://www.wpafb.af.mil/afrl/711hpw/usafsam/
DoD Health Readiness Policy and Oversight (HRP&O) Phone: (800) 497-6261. https://health.mil/Military-Health-Topics/Health-Readiness