
NOTES TO AUTHORS ON POEMS TEMPLATE AND REVIEW PROCESS

(Remove these pages before sending the POEMS for review)

- Note 1. This is a guide, not a fill-in-the-blank exercise.
- Note 2. Revise the yellow and green highlighted text according to the information available for your location(s)
- Note 3. Pay attention to the notes. The main sections are required; however, if sections below the main ones are not needed, they can be removed (e.g., if there are no PM_{10} samples, you can exclude that section).
- Note 4. Please keep standard editing rules in mind (e.g., you need two subheadings in a section).
- Note 5. Please be consistent with formatting.
- PM_{10} , $PM_{2.5}$, O_3 , NO_2 , and others with subscripts should be subscripts throughout.
 - There is an empty line after each heading.
 - Make sure headings are not left stranded at the bottom of the page.
 - Table headings carry with split tables.
 - Table rows do not break across pages.
- Note 6. This document uses MS Word formatting styles that are incorporated into the final PDF. Do not manually change or add heading numbers.
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Camp XXX, Country: Year to Year

**Military Deployment
Periodic Occupational and Environmental Monitoring Summary (POEMS):**

Camp XXX, Country

Calendar Years: XXXX to XXXX

AUTHORITY: This Periodic Occupational and Environmental Monitoring Summary (POEMS) has been developed in accordance with Department of Defense Instructions (DoDI) 6490.03 and 6055.05 (References 1–2).

PURPOSE: This POEMS documents the Department of Defense (DoD) assessment of occupational and environmental health (OEH) risk for Base **camp XXX, Country**. It presents a qualitative summary of OEH risks identified at **Camp XXX** and the potential medical implications. The POEMS is based on information collected from **Day Month Year** through **Day Month Year** to include deployment OEH area surveillance sampling and monitoring data (e.g., air, water, and soil), field investigation and health assessment reports, **and the Goddard Earth Observing System Composition Forecasting (GEOS-CF) model** as well as country and area-specific information on endemic diseases.

This assessment assumes that environmental area sampling at **Camp XXX** during this period was performed at **representative exposure points** selected to characterize health risks at the population-level. Due to the nature of environmental area sampling, these data upon which this POEMS is based may not be fully representative of all the fluctuations in environmental quality, capture unique occurrences, or necessarily reflect individual exposures. **The representativeness of the GEOS-CF modeled concentration data may be limited because it was averaged over a large air and land area that included Camp XXX and the surrounding region.** While health risks pertaining to historic or future conditions at this site might be like those described in this POEMS, this health risk assessment is limited to the time period of **Day Month Year** through **Day Month Year**, cannot be extrapolated or generalized to other date ranges or locations, and cannot be confidently assigned to individuals.

The POEMS can be used to inform healthcare providers and others of environmental conditions and potential environmental exposures experienced by individuals deployed to **Camp XXX** during the period of this assessment. To reiterate, it is at the population level but does not represent an individual's 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, ambient weather conditions, and if personal protective equipment was worn. Individual outdoor activities and associated routes of exposure are extremely variable and cannot be identified from or during environmental area sampling. Individuals who sought medical treatment related to OEH exposures while deployed should have exposure/treatment noted in their medical records on a paper Standard Form (SF) 600 (Chronological Record of Medical Care) and/or in their electronic health records.

SITE DESCRIPTION: Add general site description. Include the following information: the general setting, things that may affect air quality, information about soil, water (source, etc.) and exposure information.

Commented [A1]: Provide the main location covered by this POEMS (i.e., Camp XXX) followed by the "and vicinity" locations in alphabetical order.

Criteria for In Vicinity:

1) look at previous POEMS for base camp list

2) base camps within 25 miles

3) terrain (use google earth)

- if base camps separated by mountains, consider excluding

as an in vicinity base camp

- if uniform terrain (i.e., flat) consider including as in vicinity base camp

Camp XXX, Country: Year to Year

[If you have multiple “in vicinity” locations and information isn’t available for all of them, include this.] Information and data were available for Camp XXX, Camp XXX, and Camp XXX; therefore, the POEMS will focus on these base camps.

The Defense Occupational and Environmental Health Readiness System – Industrial Hygiene (DOEHRS-IH; Reference XX), commonly called DOEHRS, was used to gather background information compiled from the Occupational and Environmental Health Site Assessment (OEHSA; Reference XX). [Include information from other surveys and assessments including Base Camp Assessments, Environmental Health Site Assessments, Environmental Baseline Surveys, Environmental Conditions Reports, Food and Water Risk Assessments, etc. where appropriate.]

SUMMARY: Table 1 summarizes the short- and long-term exposure conditions that may pose a health risk and provides the associated medical implications. Table 2 provides population-based risk estimates for identified OEH conditions at Camp XXX and vicinity. Following Table 2, detailed sections are provided to show the basis for these risk estimates, including methodology and consideration of any controls established to reduce health risks. In some cases (e.g., ambient air), specific controls are noted, but may not be routinely available/feasible. Table 4 provides the Disease Threat Assessment taken from the OEHSAs for Camp XXX and vicinity (Reference XX). [delete if no Table 4.]

In Tables 1 and 2 and sections 2–10 of the POEMS, health risks are described in relation to the effects on/during the mission (acute risk) and the long-term health of Service members (chronic risk). Figure 1 provides the definitions of these types of risks as outlined in Department of the Navy Tactical Reference Publication (NTRP) 4-02.9M, *Occupational and Environmental Health Site Surveillance at Deployment Locations* (Reference XX). Additionally, as discussed in this POEMS, the U.S. Environmental Protection Agency's (EPA's) ambient Air Quality Index (AQI, Reference XX) is included to further elucidate some hazards found in air. Section 2 describes the relationship between the military and EPA approaches to understanding these threats.

For chemicals, U.S. Army Public Health Command (USAPHC) Technical Guide 230 (TG 230), *Environmental Health Risk Assessment and Chemical Exposure Guidelines for Deployed Military Personnel* (Reference XX) and military exposure guidelines (MEGs) are used for estimating health-related operational risks associated with chemical exposures during deployment. A MEG is a chemical concentration which represents an estimate of the level above which certain types of health effects may begin to occur within a deployed military population after continual exposure for a specified duration.

Figure 1
Health Risk Level Descriptions

Risk Level	Short-term (Acute)	Long-term (Chronic)
Low	Health effects will have little to no risk to the mission.	Long-term health effects not expected.
Moderate	Health effects may lead to degraded mission capabilities.	Long-term health effects not expected, but possible for sensitive personnel.
High	Health effects may lead to significant degradation of capabilities.	Long-term health effects possible.
Extremely High	Health effects may lead to loss of ability to accomplish the mission.	Long-term health effects possible.

Figure 2
Hazard Severity Health Effects Definitions

Hazard Severity	Short-term (Acute)	Long-term (Chronic)
Negligible	Few exposed personnel (if any) are expected to have noticeable health effects during mission	Few exposed personnel (if any) are expected to develop delayed onset, irreversible effects
Marginal	Many exposed persons are expected to have noticeable but not incapacitating health effects	Many exposed personnel are plausibly expected to develop delayed onset, irreversible effects
Critical	Indicates personnel are expected to have incapacitating health effects that require immediate medical treatment or support	The majority (or all) exposed personnel are plausibly expected to develop delayed onset, irreversible effects.
Catastrophic	Severe incapacitating effects requiring immediate and significant medical attention	Those that survive the acute situation may be at increased risk for certain chronic effects

There are four hazard severity categories for MEGs which indicate the relative magnitude of potential adverse health effects within the population when their exposure matches the assumed conditions: negligible, marginal, critical, and catastrophic. Figure 2 shows the hazard severity health effects definitions from TG 230. Please refer to TG 230 (Reference XX) for complete details regarding the MEGs and the risk assessment methodology.

[Read over the information in the table and check for things like single space after period, consistent PM subscripts, etc.]

Table 1. Summary of Occupational and Environmental Health Hazards and Their Medical Implications

Summary of OEH Hazards and Their Medical Implications
<i>The following hazards may potentially cause ACUTE health effects in some personnel during deployment at Camp XXX and vicinity, Country:</i>
1. Air pollution, air quality, airborne environmental exposures: (a) Particulate matter: (b) Metals: (c) Ozone: (d) Nitrogen Dioxide: (e) Volatile Organic Compounds:
2. Soil contamination (metals, organic compounds, inorganic compounds):
3. Water quality (drinking and non-drinking water): (a) Drinking water: (b) Non-drinking water:
4. Endemic diseases: (infectious and communicable diseases, vaccine preventable/non-vaccine preventable diseases, of all routes including: food & waterborne, arthropod vector borne, water contact, respiratory, animal contact, aerosolized dust or soil contact):
5. Venomous animals: (a) Snakes: (b) Scorpions: (c) Spiders:
6. Thermal stresses: (a) Heat: (b) Cold:
7. Noise: (a) Continuous: (b) Impulse:
8. Unique incidents/concerns (pesticides/pest control):
9. Burn pits:

Summary of OEH Hazards and Their Medical Implications

The following hazards may potentially cause **CHRONIC** health effects in some personnel during deployment at **Camp XXX** and vicinity, **Country**:

1. Air pollution, air quality, airborne environmental exposures:
 - (a) **Particulate matter:**
 - (b) **Metals:**
 - (c) **Ozone:**
 - (d) **Nitrogen Dioxide:**
 - (e) **Volatile Organic Compounds:**
2. Soil contamination (**metals, organic compounds, inorganic compounds**):
3. Water quality (drinking and non-drinking water):
 - (a) **Drinking water:**
 - (b) **Non-drinking water:**
4. Endemic diseases: (infectious and communicable diseases, **vaccine preventable/non-vaccine preventable**, of all routes including: food & waterborne, arthropod vector borne, water contact, respiratory, animal contact, **aerosolized dust or soil contact**):
5. Venomous animals:
 - (a) Snakes:
 - (b) Scorpions:
 - (c) Spiders:
6. Thermal stresses:
 - (a) **Heat:**
 - (b) **Cold:**
7. Noise:
 - (a) Continuous
 - (b) Impulse:
- 8. Unique incidents/concerns (pesticides/pest control):**
9. Burn pits:

The Department of Veterans Affairs launched its revamped Airborne Hazards and Open Burn Pit Registry (AHOBPR) on 01 August 2024 (<https://veteran.mobilehealth.va.gov/AHBurnPitRegistry/index.html#page/home>). It is their second version of the registry, and it expands participation criteria, defines opt-out procedures, and automatically enrolls participants from certain U.S. military OCONUS deployment operations and campaigns from 1990 to the present as directed by Congressional legislation. (See section 2.2 for further details.)

Commented [A2]: Retain **ONLY** if your location is covered by the AHOBPR (see section 2.2 for locations covered).

Camp XXX, Country: Year to Year

Table 2. Population-Based Health Risk Estimates – Camp XXX, Country (References 1, 2)

Source of Identified Health Risk ³	Unmitigated Health Risk Estimate ⁴	Control Measures Implemented	Residual Health Risk Estimate ^{4,5}
AIR			
Particulate matter less than 10 micrometers in diameter (PM ₁₀)	Short-term: Low . A majority of the time mild acute (short term) health effects are anticipated; certain peak levels may produce mild eye, nose, or throat irritation in some personnel and pre-existing health conditions (e.g., asthma, or cardiopulmonary diseases) may be exacerbated.	Limiting strenuous physical activities during periods of high PM levels; and actions such as closing tent flaps, windows, and doors.	Short-term: Low . A majority of the time mild acute (short term) health effects are anticipated; certain peak levels may produce mild eye, nose, or throat irritation in some personnel and pre-existing health conditions (e.g., asthma, or cardiopulmonary diseases) may be exacerbated.
	Long-term: No health guidelines		Long-term: No health guidelines
Particulate matter less than 2.5 micrometers in diameter (PM _{2.5})	Short-term: Low to High . Daily levels vary; acute health effects (e.g., upper respiratory tract irritation) may be more pronounced during days with elevated PM levels. A majority of the time mild acute (short-term) health effects are anticipated; certain peak levels may produce notable 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 during periods of high PM levels, and actions such as closing tent flaps, windows, and doors. [Other controls may include things like dust suppression for unpaved roads]	Short-term: Low to High . Daily levels vary; acute health effects (e.g., upper respiratory tract irritation) may be more pronounced during days with elevated PM levels. A majority of the time mild acute (short-term) health effects are anticipated; certain peak levels may produce notable eye, nose, or throat irritation in some personnel and pre-existing health conditions (e.g., asthma or cardiopulmonary diseases) may be exacerbated.
	Long-term: Low to Moderate . 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 or other pre-existing respiratory diseases).		Long-term: Low to Moderate . 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 or other pre-existing respiratory diseases).
Metals	Short-term: None identified based on available data.		Short-term: None identified based on available data.
	Long-term: None identified based on available data.		Long-term: None identified based on available data.
Ozone (O ₃)	Short-term: None identified based on available data.	Limiting strenuous physical activities when air quality is particularly poor; and actions such as closing tent flaps, windows, and doors.	Short-term: None identified based on available data.
	Long-term: None identified based on available data.		Long-term: None identified based on available data.
	Short-term: None identified based on available data.		Short-term: None identified based on available data.

Commented [A3]: This table serves as a quick reference to what is in the body of the POEMS. Make sure that Table 2 contents match health risks reported in the body of the report.

Commented [A4]: Add non-standard air pollutants (e.g., dioxins/furans, NO₂, O₃, etc.) to Table 2 if applicable.

Commented [A5]: The Control Measures Implements SHOULD be the known controls that were implemented for your location(s) if known. For example, if VS-Approved bottled water was provided for drinking then state so in that section.

Commented [A7]: Example language if insufficient samples. Same applies to PM_{2.5}: Although there were not enough samples to quantify risk during the time period of this assessment, daily levels varied. Acute health effects (e.g., upper respiratory tract irritation) are more pronounced during peak days. More serious effects are possible in susceptible persons (e.g., those with asthma/pre-existing respiratory diseases).

Commented [A6]: Omit row if no PM₁₀ samples were collected during the assessment timeframe

Commented [A8]: Example language if insufficient samples: Although there were not enough samples to quantify risk, 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).

Commented [A9]: Include O₃ and NO₂ in table if have NASA data.

Camp XXX, Country: Year to Year

Source of Identified Health Risk ³	Unmitigated Health Risk Estimate ⁴	Control Measures Implemented	Residual Health Risk Estimate ^{4,5}
Nitrogen Dioxide (NO ₂)	Long-term: None identified based on available data.		Long-term: None identified based on available data.
Volatile Organic Compounds (VOC)	Short-term: No data available to determine a health risk.		Short-term: No data available to determine a health risk.
	Long-term: No data available to determine a health risk.		Long-term: No data available to determine a health risk.
SOIL			
Metals, Organic Compounds, Inorganic Compounds	Short-term: No MEG available		Short-term: No MEG available
	Long-term: None identified based on available data.		Long-term: None identified based on available data.
WATER			
Drinking Water	Short-term: No data available to determine a health risk.	Using approved bottled water and potable water from only approved water sources; or, if you know the details, Bottled water from VS-approved supplies was provided for drinking and food preparation.	Short-term: No data available to determine a health risk.
	Long-term: No data available to determine a health risk.		Long-term: No data available to determine a health risk.
Non-Drinking Water	Short-term: None identified based on available data. All parameters were below the negligible MEGs.	Using water treated in accordance with standards applicable to its intended use.	Short-term: None identified based on available data. All parameters were below the negligible MEGs.
	Long-term: None identified based on available data. All parameters were below the negligible MEGs.		Long-term: None identified based on available data. All parameters were below the negligible MEGs.
ENDEMIC DISEASE			
Food borne/Waterborne (e.g., diarrhea-bacteriological)	Country specific endemic disease information is provided in Section 6. When available in the OEHSA, risk levels for particular endemic diseases are provided in Table 4.	Refer to Section 6 for preventive measures	Country specific endemic disease information is provided in Section 6. When available in the OEHSA, risk levels for particular endemic diseases are provided in Table 4.
Arthropod Vector Borne			
Water-Contact (e.g., wading, swimming)			
Respiratory			
Animal Contact			
Aerosolized Dust or Soil-contact			

Commented [A5]: The Control Measures Implements SHOULD be the known controls that were implemented for your location(s) if known. For example, if VS-Approved bottled water was provided for drinking then state so in that section.

Commented [A10]: Indicate here if it is known that the water was or was not meeting the standards. For example, lesser quality water (doesn't meet the TB MED 577 LTP standards) may have been provided for showers because that the only water available.

Commented [A11]: Make this specific to your POEMS. That is, if the OEHSA(s) provide risk levels then state so here. If not, delete this sentence.

Commented [A12]: Same comment as above

Camp XXX, Country: Year to Year

Source of Identified Health Risk ³	Unmitigated Health Risk Estimate ⁴	Control Measures Implemented	Residual Health Risk Estimate ^{4,5}
VENOMOUS ANIMALS			
Snakes, scorpions, and spiders	Short-term: Low; If encountered, effects of venom vary with species from mild localized swelling to potentially lethal effects.	Reduce risk by avoiding contact, proper wear of uniform (especially footwear), reducing suitable habitat, and proper and timely treatment.	Short-term: Low; If encountered, effects of venom vary with species from mild localized swelling to potentially lethal effects; most effects are self-limited if survived.
	Long-term: No data available		Long-term: No data available
HEAT/COLD STRESS			
Heat	Short-term: Variable; Risk of heat injury in unacclimatized or susceptible personnel is High for Month – Month, Moderate for Month – Month, 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 Month – Month, Moderate for Month – Month, and Low for all other months.
	Long-term: Low. The long-term risk may be greater to certain susceptible persons—those older (i.e., greater than 45 years of age), in lesser physical shape, or with underlying chronic medical/health conditions.		Long-term: Low. The long-term risk may be greater to certain susceptible persons—those older (i.e., greater than 45 years of age), in lesser physical shape, or with underlying chronic medical/health conditions.
Cold	Short-term: Low risk of cold stress/injury.	Reduce risks from cold stress with protective measures such as use of the buddy system, limiting exposure during cold weather, proper hydration and nutrition, and proper wear of issued cold weather 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 frostbite, trench-foot, and hypothermia.		Long-term: Low. Long-term health implications from cold injuries are rare but can occur especially from more serious injuries such as frostbite, trench-foot, and hypothermia.
NOISE			
Continuous (Flight Operations, Power Production)	Short-term: High to Low; High risk to individuals working near major noise hazard sources without proper hearing protection.	Reduce risk by appropriate hearing protection used by personnel in higher risk noise-hazardous areas (around major sources of continuous noise such as	Short-term: Low risk to the majority of personnel and to individuals working near major noise hazard sources who use proper hearing protection.

Commented [A5]: The Control Measures Implements SHOULD be the known controls that were implemented for your location(s) if known. For example, if VS-Approved bottled water was provided for drinking then state so in that section.

Commented [A13]: Include only if timely treatment was available; not all locations will have timely treatment available.

Commented [A14]: Reminder: this is Mitigated risk. Keep this in mind for the rest of this column.

Commented [A15]: If no information is found in the OEHS etc. then insert "No information available" for short- and long-term

Camp XXX, Country: Year to Year

Source of Identified Health Risk ³	Unmitigated Health Risk Estimate ⁴	Control Measures Implemented	Residual Health Risk Estimate ^{4,5}
	Long-term: High to Low ; High risk to individuals working near major sources without proper hearing protection.	flight lines and landing zones, and power production (e.g., generators).	Long-term: Low risk to the majority of personnel and to individuals working near major noise sources who use proper hearing protection.
Impulse	Short-term: None identified		Short-term: None identified
	Long-term: None identified		Long-term: None identified
UNIQUE INCIDENTS/ CONCERNS			
Burn Pits	Short-term: Burn pits cannot be evaluated independently from the ambient air; however, burn pit smoke may have contributed to the ambient air short-term health risk estimates. See Section 2 for the short-term ambient air health risk estimates. Exposure to burn pit smoke is variable. Exposure to high levels of PM₁₀ 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, such as those with pre-existing health conditions (e.g., asthma, or cardiopulmonary disease, which may be exacerbated). Additionally other contaminants expected from burning solid waste such as volatile or semi-volatile organic compounds, dioxins, furans or acid gases were not characterized.	Reduce risk by limiting strenuous physical activities when air quality was especially poor; and action such as closing tent flaps, windows, and doors. Other control measures may have included locating burn pits downwind of camps, increased distance from troop populations, decreased duration of burning, specifying burn times (beginning 3 hours after sunrise; ceasing 3 hours before sunset), and voluntary use of NIOSH-certified N95 filtering face piece respirators. [Use site specific information, when possible, instead of this general list]	Short-term: Burn pits cannot be evaluated independently from the ambient air; however, burn pit smoke may have contributed to the ambient air short-term health risk estimates. See Section 2 for the short-term ambient air health risk estimates. Exposure to burn pit smoke is variable. Exposure to high levels of PM₁₀ 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, such as those with pre-existing health conditions (e.g., asthma, or cardiopulmonary disease, which may be exacerbated). Additionally other contaminants expected from burning solid waste such as volatile or semi-volatile organic compounds, dioxins, furans or acid gases were not characterized.
	Long-term: Burn pits cannot be evaluated independently from the ambient air; however, burn pit smoke may have contributed to the ambient air long-term health risk estimates. See Section 2 for the long-term ambient air health risk estimates.		Long-term: Burn pits cannot be evaluated independently from the ambient air; however, burn pit smoke may have contributed to the ambient air long-term health risk estimates. See Section 2 for the long-term ambient air health risk estimates. Typically, exposure to burn pit

Commented [A5]: The Control Measures Implements SHOULD be the known controls that were implemented for your location(s) if known. For example, if VS-Approved bottled water was provided for drinking then state so in that section.

Commented [A16]: Add other Unique Incidents to table when applicable. These can include any type of "Directed Energy" weapon exposures or other non-typical exposures that are often documented in an Incident Report.

Commented [A17]: Indicate if the burn pit(s) are on and/or off the camp. Include the date range (e.g., (20xx – 20xx) if the burn pit(s) were only active during part of the period of the POEMS. Note if the burn pit(s) are operated by DoD, DoD contractor, local nationals, etc.

Camp XXX, Country: Year to Year

Source of Identified Health Risk ³	Unmitigated Health Risk Estimate ⁴	Control Measures Implemented	Residual Health Risk Estimate ^{4,5}
	<p>Typically, exposure to burn pit smoke is variable. Exposure to high levels of 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. Additionally other contaminants expected from burning solid waste such as volatile or semi-volatile organic compounds, dioxins, furans or acid gases were not characterized.</p>		<p>smoke is variable. Exposure to high levels of 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. Additionally other contaminants expected from burning solid waste such as volatile or semi-volatile organic compounds, dioxins, furans or acid gases were not characterized.</p>

Commented [A5]: The Control Measures Implements SHOULD be the known controls that were implemented for your location(s) if known. For example, if VS-Approved bottled water was provided for drinking then state so in that section.

¹This Summary Table provides a qualitative estimate of population-based short- and long-term health risks associated with the occupational and environment exposures at **Camp XXX**. 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, an individual may not have inhaled, ingested, or otherwise contacted the chemical at a sufficient concentration for a sufficient time and frequency to potentially result in a health consequence. In other words, just because a chemical may be present, it does not mean that an exposure occurred or that disease will ensue. Conversely, a person at a specific location may have experienced a unique exposure which could result in a significant individual exposure resulting in health consequences. Any such person seeking medical care should have had their specific exposure documented on a paper SF600 form and/or in their electronic medical record.

² This assessment is based on specific environmental area sampling data and reports obtained from **Day Month Year** through **Day Month Year**. Sampling locations are assumed to be representative of exposure points for the camp population but may not reflect all the fluctuations in environmental quality or capture unique exposure incidents.

³This Summary Table is organized by major categories of identified sources of health risk. It only lists those sub-categories specifically identified and addressed at **Camp XXX**. 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 supporting Defense Centers for Public Health (DCPH) to include DCPH-A (Aberdeen), formerly known as U.S. Army Public Health Center (USAPHC); DCPH-D (Dayton) or U.S. Air Force School of Aerospace Medicine (USAFSAM); DCPH-P (Portsmouth) or U.S. Navy and Marine Corps Force Health Protection Command (USNMCFHPC). 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 detail, in the following sections of this report.

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

⁵The Residual Health Risk Estimates provide the risk level(s) that remain for the potentially exposed population after the listed control measures were applied (e.g., the acute risk from noise may be 'high' initially, but if proper hearing protection was used, the risk would have decreased to 'low' for the population).

1 Health Risk Assessment

The following sections provide more detailed information on the OEH conditions and health risks summarized above. All risk assessments were performed using the methodology described in the U.S. Army Public Health Command (USAPHC) Technical Guide 230, *Environmental Health Risk Assessment and Chemical Exposure Guidelines for Deployed Military Personnel* (Reference XX). All OEH risk estimates represent residual risk after accounting for preventive controls in place. Occupational exposures and exposures to endemic diseases can be greatly reduced by properly employing preventive measures. For environmental exposures related to uncontrolled hazard sources (e.g., airborne dust), there are typically limited preventive measures available, and these measures usually have little efficacy in reducing exposure to ambient conditions.

2 Air

2.1 Air Quality Background and Exposure Guidelines

2.1.1 Background

Air pollution is a complex mixture of gaseous and particulate components, each of which can have detrimental effects on human health. While the composition of air pollution varies greatly (depending on factors such as the source, emission rate, sunlight, and wind conditions), the particulate matter (PM)-associated air pollutants typically impact health to a greater extent than the gaseous components. Gaseous components of general air pollution typically include nitrogen dioxide (NO₂), nitric oxide (NO), sulfur dioxide (SO₂), ozone (O₃) and carbon monoxide (CO).

Airborne PM is not a single pollutant but is rather a mixture of many chemical species of varying sizes and variable content. The PM usually consists of mineralogic dusts containing metals (e.g., copper, iron, nickel, vanadium, zinc), carbonaceous particles with associated adsorbed organic chemicals and reactive metals, plus nitrates, sulfates, polycyclic aromatic hydrocarbons, bacterial endotoxins, and organic matter (e.g., pollen and spores).

The PM is subclassified according to particle size into coarse (PM₁₀, diameter <10µm), fine (PM_{2.5}, diameter <2.5µm), and ultrafine (PM_{0.1}, diameter <0.1µm). Note that the fine and ultrafine PM are components of coarse PM and likewise, ultrafine PM is a component of fine PM. Environmental sampling typically focuses only on the PM₁₀ and PM_{2.5}. These two fractions are predominantly derived from different emission sources. Fine particulate arises from man-made sources while coarse particulate arises from natural sources.

Coarse particles are most likely to deposit on the surfaces of the larger airways of the upper region of the lung and do not penetrate beyond the upper bronchus. Fine particles penetrate deeper into the lungs and deposit on the small airways and alveoli. The PM_{2.5} is associated with the greatest proportion of adverse health effects related to air pollution, with the effects of long-term exposure to PM₁₀ less clear.

Commented [A18]: FINAL PUBLICATIONS CHECK – ensure all acronyms are defined the first time they're used in your POEMS. Also, you don't abbreviate or insert acronyms if a term is only used once.

2.1.2 Military Exposure Guidelines and the Air Quality Index

To communicate the risks from diminished air quality in the United States, the EPA developed the daily Air Quality Index (AQI) to characterize health risks associated with measured airborne hazards. The AQI provides a simple, standard platform to report to the general population the daily air quality conditions and their potential effects based on measurements for PM_{2.5}, PM₁₀, ground-level ozone, sulfur dioxide, nitrogen dioxide, and carbon monoxide. An index score using the concentration of each measured pollutant is generated and the highest score is used to assign the day's AQI category, which is reported to the public. For deployed settings, the Military Exposure Guidelines are used similarly to evaluate the health risks to deployed personnel, except these risks are communicated to a commander so that they will understand the risk to both the mission and the long-term health implications for personnel from ambient exposures to these airborne hazards.

Although the populations are different, the two approaches are fundamentally related in that the PM concentrations used to determine the AQI index scores were also used to derive the MEGs by relating the expected health effects estimated by the EPA to the hazard severity levels described in Figure 2. Table 3 shows the relationship between the PM MEGs used to generate the risk estimates (using those severity levels) and the AQI categories.

Table 3. Relationship of 24-Hour Particulate Matter Exposure Guidelines and their Association to AQI Categories

24 Hour Particulate Matter MEG and HRA Severity Level Definitions		EPA AQI Daily (24-hr) Concentration Ranges and Their Health Effects Descriptions. ¹		
PM _{2.5} (µg/m ³)	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	PM ₁₀ (µg/m ³)	AQI Category
Concentrations in this range are not considered to represent an "acute hazard" within the TG 230 risk assessment framework		0 - 12	0 - 54	<u>Good</u>
		12.1 - 35.4	55 - 154	<u>Moderate</u>
		35.5 - 55.4	155 - 254	<u>Unhealthy for Sensitive Groups</u>
Negligible 65 - 250	Negligible 250 - 420	55.5 - 150.4	255 - 354	<u>Unhealthy</u>
A few personnel may experience notable mild eye, nose, or throat irritation; most personnel will experience only mild effects. Pre-existing health conditions (e.g., asthma, or cardiopulmonary diseases) may be exacerbated.		150.5 - 250.4	355 - 424	<u>Very Unhealthy</u>
Marginal 250 - 500	Marginal 420 - 600	250.5 - 500.4	425 - 604	<u>Hazardous</u>

Camp XXX, Country: Year to Year

24 Hour Particulate Matter MEG and HRA Severity Level Definitions		EPA AQI Daily (24-hr) Concentration Ranges and Their Health Effects Descriptions. ¹		
PM _{2.5} (µg/m ³)	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	PM ₁₀ (µg/m ³)	AQI Category
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 disease are expected to experience increased symptoms.				
Critical 500 and higher	Critical 600 and higher	500.5 and higher	605 and higher	Extremely Hazardous
Most if not all personnel will experience very notable eye, nose, and throat irritation and respiratory effects. Visual acuity is impaired, as is overall aerobic capacity. Some personnel will not be able to perform assigned duties. Some lost-duty days are expected. Those with a history of asthma or cardiopulmonary disease will experience more severe symptoms. Conditions may also result in adverse, non-health related materiel/logistical impacts.				

Note:

¹ EPA Technical Assistance Document for the Reporting of Daily Air Quality – the Air Quality Index (AQI), EPA 454/B-18-007, September 2018, [aqi-technical-assistance-document-sept2018.pdf](https://www.airnow.gov/aqi-technical-assistance-document-sept2018.pdf) ([airnow.gov](https://www.airnow.gov))

2.1.3 Components of Burn Pit Smoke

[Include if a burn pit was present and affecting the air quality]

The composition of burn pit smoke is complex due to factors including variations in the waste types; the moisture content; the combustion temperature and completeness of combustion; the size, volume, depth, and layout (e.g., waste in windrows or piles) of the open burn pits; and the local environmental conditions during a burn. The pollutants resulting from the burning of wastes will vary across initiation, flaming, and smoldering combustion, and can include variable amounts of dioxins and furans, particulate matter, polycyclic aromatic hydrocarbons, unsaturated hydrocarbons, aldehydes, volatile organic compounds, carbon monoxide, hexachlorobenzene, acid gases, metals, etc. Each of these constituents, individually or in combination, can have varying toxicities and physiologic effects. Components of burn pit smoke can also react with other PM and gases from other sources.

2.1.4 Components of Incinerator Emissions

[Add this section if your location has waste incinerators. Be sure to also note the incinerator(s) in the section below, Site-Specific Sources Identified, and include details if available.]

Camp XXX, Country: Year to Year

The composition of incinerator emissions is complex due to factors including variations in the waste types, the moisture content, the combustion temperature and completeness of combustion, the feed rates of waste into the incinerator, the stack height, the emissions control technology, the system maintenance, and the local environmental conditions during a burn. The pollutants resulting from incineration can include variable amounts of dioxins and furans, particulate matter, polycyclic aromatic hydrocarbons, unsaturated hydrocarbons, aldehydes, volatile organic compounds, carbon monoxide, hexachlorobenzene, acid gases, metals, etc. Each of these constituents individually or in combination can have varying toxicities and physiologic effects. Components of emissions can also react with other PM and gases from other sources.

Commented [A19]: Think about the site scenario and if any additional content would be appropriate to add. For example, add an explanatory paragraph if the camp is surrounded by or adjacent to a major air pollution emitter.

2.2 Airborne Hazards and Open Burn Pit Registry

[If your location is covered by the AHOBPR registry, add this section.]

On 01 August 2024 the Department of Veteran's Affairs (VA) launched its revised Airborne Hazards and Open Burn Pit Registry (AHOBPR) version 2, <https://veteran.mobilehealth.va.gov/AHBurnPitRegistry/index.html#page/home>, that expands participation criteria and automatically enrolls participants from certain U.S. military operations and campaigns from 1990 to present as directed by legislation. The Registry automatically enrolls eligible veterans and service members based on DoD records and includes all personnel already enrolled in the original Registry. Enrollment data are limited to deployment locations, military personnel information, and demographics (gender, race, ethnicity). No medical information will be stored in the Registry. The Registry is more user friendly, and a short form has replaced the Registry questionnaire for manually requesting an eligibility review. The AHOBPR provides a simple opt-out process for veterans and service members that electively choose to not be included. The purpose of the Registry is to combine veteran and service member data to help the VA better understand the potential health effects from exposure to airborne hazards, support ongoing research, and ultimately improve treatment for the health challenges facing veterans exposed to airborne hazards and burn pits during their military service.

Commented [A20]: •Afghanistan

- Bahrain
- Djibouti
- Egypt
- Gulf of Aden,
- Gulf of Oman
- Iraq
- Jordan
- Kuwait
- Lebanon
- Oman
- Qatar
- Saudi Arabia
- Somalia
- Syria
- United Arab Emirates
- Uzbekistan
- Yemen
- Waters of the:
 - Arabian Sea
 - Persian Gulf
 - Red Sea

The Defense Health Agency in concert with the VA will provide medical exams when there are symptoms that are either suggestive of past AHOBPR environmental exposures or when the provider has a clinical concern. Exposed individuals are eligible for DoD and/or VA care for 23 presumptive medical conditions per the Sergeant First Class Heath Robinson Honoring our Promise to Address Comprehensive Toxics Act of 2022 (PACT Act).

The VA website (<https://www.publichealth.va.gov/exposures/burnpits/index.asp>) provides airborne hazards and burn pit exposure information including presumptive conditions, a map of eligible countries, and information about the AHOBPR. The DoD provides additional information as it relates to the AHOBPR on its website (<https://www.health.mil/Military-Health-Topics/Health-Readiness/Environmental-Exposures/VA-Airborne-Hazards-and-Open-Burn-Pit-Registry>).

In 2013, Congress directed the VA to establish and maintain the AHOBPR to help service members and veterans document potential exposure to airborne hazards and open burn pit

Camp XXX, Country: Year to Year

toxicants while deployed to certain locations supporting specific operations. In February 2017, the National Academies of Sciences, Engineering, and Medicine (NASEM) published the Assessment of the Department of Veterans Affairs Airborne Hazards and Open Burn Pit Registry which offered an initial assessment of the registry, analysis of the data collected in the first year, and recommendations for improvements (Reference XX). In 2022, NASEM published the Reassessment of the Department of Veterans Affairs Airborne Hazards and Open Burn Pit Registry (Reference XX) which assessed the ability of the registry to fulfill its intended purposes that Congress and VA had specified for it.

Commented [A21]: If this section is deleted, remove the references from the References section.

2.3 Air Data Collection Methods

2.3.1 Sampling Methods

[Describe sampling efforts here to separate them from the modeled concentrations. Add and/or delete content as needed for your specific POEMS.]

Ambient air samples were typically collected from points considered to be in areas representative of the ambient air to which personnel were exposed. These samples were collected over a 24-hour period and the results represent the average concentration over that collection period (e.g., a sample concentration of 20 $\mu\text{g}/\text{m}^3$ applies to the 24 hours overall, not to any particular time during those hours). Sampled parameters included PM and 10 associated metals, collected on quartz fiber filters; volatile organic compounds (VOCs), collected in stainless steel canisters; dioxin-like compounds, collected on quartz fiber filters and polyurethane foam cartridges; and polycyclic aromatic hydrocarbons (PAH), collected on quartz fiber filters and resin-filled cartridges.

2.3.2 GEOS-CF Modeled Concentrations

The Global Modeling and Assimilation Office (GMAO) of the National Aeronautics and Space Administration (NASA) utilizes the GEOS-CF model for applications involving physical, chemical, and biological processes. One of the unique applications of the GEOS-CF model is its ability to calculate air pollution conditions anywhere in the world. This is done by combining physical knowledge about pollutant emissions, chemical transformation, atmospheric transport and deposition, and meteorology with real-time observations from both satellites and surface observations. The modeled data consists of hourly concentration information for PM_{2.5}, NO₂, and O₃. The estimate of surface concentrations is an average over a 25 kilometer x 25 kilometer grid in the lowest 130 meters of the atmosphere (Reference XX). The model assumes a well-mixed homogenous atmosphere both horizontally and vertically within the modeled space. The risk assessment discussion below incorporates the GEOS-CF modeled data for PM_{2.5}, NO₂, and O₃.

2.4 Site-Specific Sources Identified

Emissions from vehicular traffic, power generators, and burn pits on and off the base camp [insert site specific exposure information] contributed to the ambient air environment at Camp XXX.

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Inhalational exposure to high levels of 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 or cardiopulmonary conditions) are at greatest risk of developing notable adverse health effects.

2.5 Particulate Matter, less than 10 micrometers

2.5.1 Exposure Guidelines:

Short-term (24-hour) PM₁₀ MEGs (µg/m³):

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

Long-term (1-year) PM₁₀ MEGs (µg/m³):

- Not available

2.5.2 Sample Data/Notes:

A total of XX valid PM₁₀ air sample were collected in Year at Camp XXX. When more than one sample was collected on a single day, the PM₁₀ concentrations were averaged to provide a daily concentration. The range of 24-hour PM₁₀ concentrations was XX µg/m³ – XX µg/m³ with an average concentration of XX µg/m³. [Use integers for all PM concentrations.] Note that XX additional samples were collected but invalid due to equipment or laboratory errors.

2.5.3 Short-term Health Risks:

[This is an example for samples collected for 1 year. For samples collected for multiple years, see next PM_{2.5} section where the years are broken out and assessed separately.]

Low. The short-term PM₁₀ health risk was **Low** based on average and peak PM₁₀ concentrations, and the likelihood of exposure at these hazard severity levels. A **low** health risk suggests that short-term exposure to PM₁₀ at Camp XXX was expected to have little to no impact on the mission (Reference XX, Table 3-2). Confidence in the short-term PM₁₀ health risk assessment was **low** (Reference XX, Table 3-6).

XX of XX PM₁₀ sample concentrations were in the **Negligible** hazard severity range (250–420 µg/m³), XX were in the **Marginal** hazard severity range (420–600 µg/m³), and XX were in the **Critical** hazard severity range (> 600 µg/m³). For exposures at the **Negligible** hazard severity level, a few personnel may experience notable eye, nose, and throat irritation; most personnel will experience only mild effects. For 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. For exposures at the **Critical** hazard severity level, most if not all personnel will experience very notable eye, nose, and throat irritation and respiratory effects. Visual acuity is impaired, as is overall aerobic capacity. Some lost-duty days are expected (Reference XX, Table 3-11).

Commented [A22]: 1. **No data** (i.e., no samples collected)
- delete entire PM10
2. **Insufficient data** (i.e., not enough data to evaluate)
- delete Exposure Guidelines section
- insert "There is insufficient data to assess the health risks from exposure to PM10" in Short-term health risks section.
3. **Data available** to evaluate health risk
• keep all Sections (see example)

Commented [A23]: Refer to Table 3-6 and provide justification.
Examples:
• limited samples were collected (the samples collected are not representative of the timeframe being evaluated).

2.5.4 Long-term Health Risks:

There are no available health guidelines to assess the health risks from exposure to PM₁₀.

2.6 Particulate Matter, less than 2.5 micrometers

2.6.1 Exposure Guidelines:

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

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

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

- Negligible MEG = 15
- Marginal MEG = 65.

2.6.2 Sample Data/Notes:

A total of XX valid PM_{2.5} air samples were collected from Year to Year at Camp XXX. When more than one sample was collected on a single day, the PM_{2.5} concentrations were averaged to provide a daily concentration. The range of 24-hour PM_{2.5} concentrations was XX µg/m³ – XX µg/m³ with an average concentration of XX µg/m³. [Use integers for all PM concentrations.] Note that XX additional samples were collected but invalid due to equipment or laboratory errors.

[Include this paragraph if you have NASA data. Omit if no NASA data.]

Hourly PM_{2.5} data were available from the GEOS-CF model for Camp XXX. These modeled data were averaged into 24-hour daily concentrations for all of CY Years and compared to the short-term (24-hour) PM_{2.5} MEGs (Reference XX). The range of 24-hour PM_{2.5} concentrations was XX µg/m³ – XX µg/m³ with an average concentration of XX µg/m³.

2.6.3 Short-term Health Risks:

[This is for a multiple year assessment using DPS data only]

Low to High. The short-term PM_{2.5} health risk based on peak sample concentrations is Moderate for Year and High for Year. For average sample concentrations, the short-term health risk was Low for Year and Year. There were not enough samples taken in Year to assess the health risk. A low health risk suggests that short-term exposure to PM_{2.5} was expected to have little or no impact on accomplishing the mission. A moderate health risk suggests that short-term exposure to PM_{2.5} was expected to have degraded mission capabilities in terms of the required mission standard and will result in reduced mission capability if hazards occur during the mission. A high health risk suggests that short-term exposure to PM_{2.5} was expected to have a significant degradation of mission capabilities in terms of the required mission standard, inability to accomplish all parts of the mission, or

Commented [A24]: 1. Insufficient data (i.e., not enough data to evaluate)
- delete Exposure Guidelines section
- insert "There is insufficient data to assess the health risks from exposure to PM2.5" in Short- and/or Long-term health risk sections. When both Sections have insufficient data combine them (e.g., Short-term and Long-term health risks).
2. Data available to evaluate health risk
• keep all Sections

Commented [A25]: Specify that these are DPS samples if have NASA data.

Camp XXX, Country: Year to Year

inability to complete the mission to standard if hazards occur during the mission (Reference XX, Table 3-2). Confidence in the short-term PM_{2.5} health risk assessment was low (Reference XX, Table 3-6). [Provide justification for the confidence level. If there is NASA data, it may result in a Low to Medium confidence. There is a large amount of data available, but there is uncertainty in the modeled data.]

The hazard severity was Negligible to Marginal for average PM_{2.5} sample concentrations. The hazard severity was Negligible for Year and Marginal for Year. At the Negligible hazard severity, a few personnel may experience notable mild eye, nose, or throat irritation; most personnel will experience only mild effects. Pre-existing health conditions (e.g., asthma and/or cardiopulmonary diseases) may be exacerbated. At the Marginal hazard severity, a majority of personnel may 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 disease are expected to experience increased symptoms (Reference XX, Table 3-11).

For the highest observed PM_{2.5} concentration, the hazard severity was Critical. During peak exposures at the critical hazard severity level, most if not all personnel may experience eye, nose, and throat irritation and respiratory effects. Visual acuity is impaired, as is overall aerobic capacity. Some personnel will not be able to perform assigned duties. Lost-duty days are expected. Those with a history of asthma or cardiopulmonary disease will experience more severe symptoms (Reference XX, Table 3-11).

Individual exposures to PM_{2.5} may vary, as exposure and environmental conditions can 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. For PM_{2.5}, certain subgroups of the deployed forces (e.g., those with pre-existing asthma and/or cardiopulmonary conditions) are at greatest risk of developing adverse health effects. Some individuals may have sought treatment for acute respiratory irritation while on deployment. Personnel who reported to their medical units with symptoms or who required treatment would likely have had their clinical encounters and treatment noted in the medical record [e.g., electronic medical record (EMR) and/or on a paper chart Standard Form (SF) 600 (Chronological Record of Medical Care)].

XX of XX PM_{2.5} sample concentrations were in the Negligible hazard severity range (65–250 µg/m³), XX were in the Marginal hazard severity range (250–500 µg/m³), and XX were in the Critical hazard severity range (> 500 µg/m³).

Commented [A26]: If NASA data exists include a similar paragraph since they are evaluated separately in this context.

2.6.4 Long-term Health Risks:

[This is an example when enough samples are available to determine a long-term health risk.]

Low to Moderate. The long-term health risk is Low for Year and Moderate for Year based on the average PM_{2.5} concentration, and the likelihood of exposure at this hazard severity level. A low health risk for average exposure concentrations suggests that long-term exposure to PM_{2.5}

Camp XXX, Country: Year to Year

was not expected to result in specific future medical action for the population. A moderate health risk suggests that long-term exposure to PM_{2.5} was expected to require limited future medical surveillance activities for the population (Reference XX, Table 3-3). Confidence in the long-term PM_{2.5} health risk assessment is low (Reference XX, Table 3-6). [Provide justification for selecting a confidence level.]

The hazard severity was Negligible for average PM_{2.5} sample concentrations. With repeated exposures, it is plausible that a small percentage of personnel may be at increased risk for developing chronic conditions (e.g., reduced lung function, exacerbated chronic bronchitis, asthma, or cardiopulmonary diseases), particularly those more susceptible to acute effects (e.g., those with asthma or pre-existing/underlying respiratory diseases). Those with a history of asthma and/or cardiopulmonary disease are considered to be at particular risk (Reference XX, Table 3-12).

It is possible that some otherwise healthy individuals who experienced PM_{2.5} exposures for an extended duration of time, especially at higher levels, could have health effects (e.g., reduced lung function, cardiovascular disease, pulmonary disease, cancer) that will not resolve after the exposure ends. Personnel with a history of asthma and/or cardiopulmonary disease could potentially be more likely to develop such chronic health conditions. The contribution of chronic PM_{2.5} exposures to an individual's present health status should be considered, especially in individuals with underlying conditions or susceptibilities (e.g., asthma, older age). Certain individuals might have had unique exposures (due to their occupation while deployed) that might have been contributory to long-term adverse health outcomes.

2.7 Metals from PM

2.7.1 Exposure Guidelines

[If a metal exceeds the 1-year Negligible MEG and is carried through the short or long-term risk assessment, provide MEGs for that metal in this section, otherwise delete.]

2.7.2 Metals from PM₁₀

2.7.2.1 Sample Data/Notes:

A total of XX valid PM₁₀ samples were analyzed for metals at Camp XXX from Year to Year to assess OEH health risk to deployed personnel.

2.7.2.2 Short-term and Long-term Health Risks

[If have same conclusion for short and long-term health risk, combine sections. If not, then separate into Short-term health risks and Long-term health risks.]

None identified based on available sample data. No metal concentrations exceeded their respective 1-year Negligible MEGs.

Commented [A27]: If insufficient data (i.e., not enough data to evaluate)
- delete Exposure Guidelines section
- insert "There is insufficient data to assess the health risks from exposure to airborne metals" in Short-term and Long-term health risks sections

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2.7.3 Metals from PM_{2.5}

2.7.3.1 Sample Data/Notes:

A total of XX valid PM_{2.5} samples were analyzed for metals at Camp XXX from Year to Year to assess OEH health risk to deployed personnel.

2.7.3.2 Short-term and Long-term Health Risks

None identified based on available sample data. No metals concentrations exceeded their respective 1-year Negligible MEGs.

2.8 Volatile Organic Compounds

[If no VOC data – delete Exposure Guidelines, Sample data/Notes, and Short-term and Long-term health risks sections and add “No VOC samples were collected from Camp XXX during the timeframe of this assessment.”]

2.8.1 Exposure Guidelines

[If a VOC exceeds the 1-year Negligible MEG and is carried through the short- and long-term risk assessment, provide MEGs for that VOC, otherwise delete.]

2.8.2 Sample Data/Notes:

A total of XX valid VOC samples were collected at Camp XXX from Year to Year to assess OEH health risk to deployed personnel.

2.8.3 Short-term and Long-term Health Risks:

None identified based on available sample data. No VOC concentrations exceeded their respective 1-year Negligible MEGs.

2.9 Ozone

[Include this section if have NASA data.]

2.9.1 Exposure Guidelines

[Note that units are parts per billion (ppb).]

Short-term (1-hour) O₃ (ppb):

- Negligible MEG = 204
- Marginal MEG = 1,020
- Critical MEG = 5,102

Short-term (8-hour) O₃ (ppb):

- Negligible MEG = 199

Long-term(1-yr) O₃ (ppb):

- Negligible MEG = 20

Commented [A28]: If insufficient data (i.e., not enough data to evaluate)
- delete Exposure Guidelines section
- provide summary of the data that are insufficient (e.g., 2 samples were collected over 5 years and do not represent air quality over the time period of this POEMS).
- insert “There is insufficient data to assess the health risks from exposure to airborne VOCs” in Short-term and Long-term health risks sections (or combine into one section if it applies)

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2.9.2 Sample Data/Notes:

Hourly O₃ data was available from the GEOS-CF model for Camp XXX from Year to Year to assess OEH health risk to deployed personnel. These data were evaluated as the rolling average for each 8-hour period across the year compared to the 8-hour (short-term screening) O₃ MEG. The range of 8-hour concentrations was XX ppb – XX ppb with an annual average concentration of XX ppb. The maximum 1-hour concentration was XX ppb in Year and XX ppb in Year. [Use integers for all concentrations.]

2.9.3 Short-term Health Risks:

[Compare ozone data to short-term MEGs and include confidence levels if applicable.]

2.9.4 Long-term Health Risks:

[Compare ozone data to 1-year Negligible MEG and include confidence levels if applicable.]

2.10 Nitrogen Dioxide

[Include this section if have NASA data.]

2.10.1 Exposure Guidelines

Short-term (1-hour) NO₂ (ppb)

- Negligible MEG = 500
- Marginal MEG = 12,234
- Critical MEG = 20,213

Short-term (8-hour) NO₂ (ppb)

- Negligible MEG = 500
- Marginal MEG = 7,222
- Critical MEG = 11,170

Long-term(1-yr) NO₂ (ppb):

- Negligible MEG = 500

Commented [A29]: Note that units are parts per billion (ppb)

2.10.2 Sample Data/Notes:

Hourly NO₂ data was available from the GEOS-CF model for Camp XXX from Year to Year to assess OEH health risk to deployed personnel. These data were evaluated as the rolling average for each 8-hour period across the year compared to the 8-hour (short-term screening) NO₂ MEG. The range of 8-hour concentrations was XX ppb – XX ppb with an annual average concentration of XX ppb. The maximum 1-hour concentration was XX ppb in Year and XX ppb in Year. [Use integers or limit to 2 significant figures for all concentrations.]

2.10.3 Short-term Health Risks:

[Compare NO₂ data to short-term MEGs and include confidence levels if applicable.]

2.10.4 Long-term Health Risks:

[Compare NO₂ data to 1-year Negligible MEG and include confidence levels if applicable.]

3 Soil

3.1 Site-Specific Sources Identified

The primary ways personnel were exposed to soil were through dermal contact and dust inhalation. Typical parameters analyzed for included semi-volatile organic compounds, heavy metals, polychlorinated biphenyls, radionuclides, pesticides, and herbicides. For the risk assessment, personnel are assumed to remain at this location for 6 months to 1 year.

3.2 Sample Data/Notes:

A total of XX valid surface soil samples were collected [include site specific exposure information] at Camp XX from Month Year to Month Year to assess OEH health risk to deployed personnel.

Commented [A30]: Indicate where/why samples were collected in support of the exposure info provided in 3.1. For example, if 3.1 lists the motor pool as a location of potential concern, then here in 3.2 would be where you note that 4 composite samples were collected in the motor pool area to assess that EP scenario.

3.3 Short-term Health Risks:

Not an identified source of health risk. No short-term (acute) MEGs are available for soil.

3.4 Long-term Health Risks:

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

4 Water

Deployed U.S. personnel may be exposed to hazards in water used for drinking and non-drinking purposes (e.g., bathing, hygiene, swimming). Health risks associated with the water supply are evaluated based on the exposure pathways in DOEHS and the information provided on the field data sheets that were submitted with the samples taken during the time period being evaluated. All water supplies for human contact usage are required to meet chemical and physical water quality standards (naturally or via treatment) and must be disinfected. Exceptions can be authorized in writing by the local medical authority when necessary.

4.1 Drinking Water

4.1.1 Site-Specific Sources Identified

[Include site-specific water source information including all treatment processes (ROWPU, TWPS, etc.) for drinking water.]

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The OEHSA for Camp XXX indicated that bottled water was the only approved water supply for drinking and teeth brushing. The OEHSA identified one approved (Reference XX) bottled water brand, Al Waha® that was provided for drinking.¹ However, there were no bottled water samples provided for evaluation.

Commented [A31]: Add Footnote for trademarked water bottle brand. Go to "References" tab, "Insert footnote".

4.1.2 Short-term and Long-term Health Risks:

No available sample data to determine a health risk.

4.2 Non-Drinking Water

4.2.1 Site-Specific Sources Identified

[If you have field test results (e.g., coliforms, E.coli, etc.) and/or inspection narrative or water storage conditions information (found in BCAs or OEHSAs), then provide it.]

Commented [A32]: Include site-specific water source information including all treatment processes (ROWPU, TWPS, etc.) for non-drinking water. Specify the non-drinking uses of each water supply. Be clear if the water is chlorinated (they add chlorine) or actually known to be disinfected (post-chlorine, water tested negative for coliforms/e. coli).

The non-drinking water supply was reported to be off-site well water that was transported to the base camp, transferred into water tanks, and disinfected with chlorine tablets. Although the primary route of exposure for most microorganisms is the ingestion of contaminated water, dermal exposure to some microorganisms, chemicals, and biologicals may also cause adverse health effects.

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 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 XX non-drinking water samples (XX treated and XX untreated) were collected at Camp XXX and were used for showering, personal hygiene, and cooking.

4.2.3 Short-term and Long-term Health Risks:

None identified based on available sample data. All analyte concentrations were below their short- and long-term negligible MEGs.

Commented [A33]: Add a statement for water that doesn't meet LTP standards but is being used for Class 1 uses anyway (showers, personal hygiene, etc.)

Example to consider when the water doesn't meet LTP standards (customize to the scenario for your POEMS):

However, the water did not meet the long-term potability (LTP) standards for 'Class I' usage, which includes showers and personal hygiene.

Water of lower quality can be authorized for use by the local medical authority based on the overall risk profile at a deployed location. -OR- if known, indicate that the medical authority did authorize use of this water.

5 Military Unique

[Provide site-specific information if available. If no information is available, use standard language. Other military unique exposures can be added to this section when information is available.]

¹ Identification of a trademarked product does not imply endorsement by the Army.

5.1 Chemical, Biological, Radiological

No specific hazard sources were documented in the DOEHS from Day Month Year through Day Month Year.

5.2 Depleted Uranium

No specific hazard sources were documented in the DOEHS from Day Month Year through Day Month Year.

5.3 Ionizing Radiation

No specific hazard sources were documented in the DOEHS from Day Month Year through Day Month Year.

5.4 Non-Ionizing Radiation

No specific hazard sources were documented in the DOEHS from Day Month Year through Day Month Year.

6 Endemic Diseases

This document lists the endemic diseases reported in the region found on the Centers for Disease Control and Prevention (CDC) website (Reference XX) and Shoreland Travax website (Reference XX). CENTCOM Modification (MOD) 13, 14, 15, 16, and 17 (References XX-XX) lists deployment requirements, to include immunizations and chemoprophylaxis, in effect during the timeframe of this POEMS. Risk estimates for various diseases were found under the Entomology (Disease Threats) section in the OEHSA(s) and are summarized in Table 4. The source(s) and method(s) used to generate the risk estimates were not specified in the OEHSA(s) for Camp XXX (Reference XX).

Table 4. Disease Threat Assessment from Camp XXX OEHSA(s)

Disease Threat	Risk Estimate
Crimean-Congo Hemorrhagic Fever	Moderate
Sand Fly Fever	Low
Typhus (Murine)	Low
Leishmaniasis (Cutaneous)	Low
West Nile Fever	Low

6.1 Foodborne and Waterborne Diseases

[Update the Endemic Disease sections to make base camp/country specific.]

Commented [A34]: Please check the OEHSA(s) and BCA(s) for source info including laser, microwave, radiofrequency (RF), ultra high frequency (UHF)/very high frequency (VHF), etc items. It may be generic (e.g., commo equipment) or may specify the device/system. When hazard sources are documented, particularly in a BCA, there should be information about controls. These NIR sources usually have engineering controls and users have protocols to specify the administrative controls. Typically you should be able to at least state that engineering and administrative controls were in place to minimize the likelihood of exposure. For most if not all NIR sources, the primary health threat is thermal injury to the eyes or exposed skin.

Commented [A35]: Ensure that the appropriate COCOM is noted and referenced. For example, have a CENTCOM or AFRICOM specific Endemic Diseases section.

Commented [A36]: For AFRICOM use: USAFRICOM Force Health Protection Requirements and Medical Guidance for Entry into the U.S. Africa Command Theater References. *Make sure assessment dates match up with reference dates

Commented [A37]: Some OEHSAs state where risk estimates were obtained, so provide that information if available.

Foodborne and waterborne diseases and endemic diseases may occur in deployed personnel especially when good preventive medicine measures are not practiced. Food and waterborne diseases (e.g., bacterial diarrhea, viral hepatitis A, protozoal diarrhea) may arise if contaminated local food and unapproved local water are ingested. The health effects can temporarily incapacitate personnel (e.g., diarrhea) or result in a prolonged illness (e.g., hepatitis A, typhoid). Mitigation measures include immunization (e.g., hepatitis A and typhoid vaccines) and only drinking from approved water sources.

Foodborne and waterborne diseases in the area are transmitted through the consumption of contaminated local food and water. Local unapproved food and water sources (including ice) are typically heavily contaminated with pathogenic bacteria, parasites, and viruses to which most U.S. Service members have little or no natural immunity. Risks from food/waterborne diseases may have been reduced with preventive medicine controls and mitigation, which includes vaccinations, frequent hand washing measures, general good sanitation practices, and consuming food and water exclusively from approved sources according to standing **CENTCOM** policy. Host nation public health disease surveillance and public health infrastructure are either ineffective or absent [[confirm for your location](#)] in the country, which may make disease threats more difficult to predict and to consequently provide effective public health countermeasures.

6.1.1 Diarrheal Diseases (bacterial, viral, parasitic)

Diarrheal diseases are expected to temporarily incapacitate a very high percentage of personnel within days if contaminated local food, water, or ice are consumed. Field conditions (including lack of hand washing and primitive sanitation) may facilitate person-to-person infectious disease spread and epidemics. Typically, diarrheal diseases are mild diseases treated in an outpatient setting with recovery and return to duty in less than 72 hours. Milder traveler's diarrhea is common amongst travelers and is associated with loose stools and abdominal cramps. It may require treatment that may involve oral or intravenous (IV) rehydration and sometimes oral or IV electrolyte solution. It is most frequently due to a particular bacterium (enterotoxigenic *Escherichia coli*). *It may also be due to certain viruses (including Rotavirus and Enteroviruses) and parasites (notably Giardia lamblia)*. A more serious diarrheal disease is dysentery that results from certain parasitic or bacterial infections and is characterized as a bloody diarrhea often associated with a fever. Dysentery is comprised of amoebic dysentery (amoebiasis) (caused by *Entamoeba histolytica*, *Balantidium coli*, and *strongyloidiasis*), and bacillary dysentery (caused by *Shigella*, *Salmonella*, *Campylobacter* and *Escherichia coli* (e.g., *E. coli* O157 (enterohemorrhagic *E. coli*); other serious *E. coli* types are enteropathogenic, enteroinvasive, enterohemorrhagic, and enteroadherent). Bacillary dysentery is the most common type of dysentery. Dysentery requires treatment and may necessitate hospitalization.

6.1.2 Hepatitis A Virus (HAV), Typhoid/Paratyphoid Fever, and Diarrhea-Protozoal

Hepatitis A Virus, typhoid/paratyphoid fever, and diarrhea-protozoal disease may cause prolonged illness in a small percentage of unvaccinated personnel, if exposed. HAV is a viral infection transmitted through direct person-to-person contact or through ingestion of contaminated food or water. HAV can survive in the environment for prolonged periods of time,

and it can be transmitted through ice and frozen foods. Individuals are most infectious 1–2 weeks before the onset of clinical signs and symptoms. Typhoid and paratyphoid fevers are bacterial diseases acquired through consumption of water or food contaminated by feces of an acutely infected person. *Salmonella typhi* and *Salmonella paratyphi* bacteria cause typhoid fever and paratyphoid fever, respectively. Immunization can effectively prevent hepatitis A and typhoid fever. There is no specific antiviral medication treatment for hepatitis A. Effective antibiotics are available to treat typhoid fever and paratyphoid fever.

6.1.3 Diarrhea-cholera

Cholera is a *Vibrio cholerae* bacterial disease usually spread through contaminated water, which causes severe diarrhea and dehydration. Cholera may range from mild infection (with recovery and return to duty in less than 72 hours with appropriate outpatient treatment) to severe disease (requiring 1–7 days of supportive or inpatient care, followed by return to duty). About 10% of those with cholera infection will develop severe symptoms. Mitigation strategies in place include consumption of approved food, water, and ice; hand washing; and applied food/water safety mechanisms. There are currently two approved vaccines available.

6.1.4 Brucellosis

Brucella causes a common bacterial disease (Brucellosis) in cattle, sheep, goats, swine, and some wildlife species and is contracted via consumption of contaminated dairy products (or foods made with such products) or by occupational exposures to infected animals. Mitigation strategies in place include consumption of approved food and applied food/water safety mechanisms. Brucellosis in humans is a febrile illness of variable severity that may require inpatient care. It is typically associated with flu-like symptoms of fever, sweats, headaches, back pains, and weakness. There is no vaccine for humans. Depending on the timing of treatment and severity of illness, recovery may take a few weeks to several months. Death from brucellosis is rare. Typically, prolonged combination antibiotic treatment is required (minimum of 6–8 weeks).

6.1.5 Hepatitis E

Hepatitis E is spread by fecal/oral route. It usually produces a mild disease. However, disease symptoms can vary from no apparent symptoms to liver failure. In rare cases, it can prove fatal, particularly in pregnant women. Normally, the virus infection will clear by itself. Hepatitis E is a Herpesviridae virus that occurs in five major genotypes including genotype (gt) 1, gt2, gt3, gt4, and gt7. Gt1 and gt2 are pathogenic only for humans; gt3 and gt4 have animal reservoirs in swine, deer, wild boars, and rabbits; and gt7 has a reservoir in camels. Gt1 strains are found primarily in the Indian subcontinent (China, Bangladesh, Nepal, Pakistan, Afghanistan, and most countries in sub-Saharan Africa), whereas gt2 strains are found primarily in Mexico, Nigeria, Chad, Sudan, and the Central African Republic. Gt3 strains are present in Europe, the United States and other North American countries, Central and Southern Japan, New Zealand, and Australia, whereas gt4 strains are present in China, northern Japan, and India. Gt7, the most recently identified strain, has currently only been identified in the United Arab Emirates. The most common source of exposure is fecal contamination of drinking water. Mitigation strategies in place include consumption of approved

Commented [A38]: Suggest keeping the strain(s) that may apply to your location and deleting the rest. Look at different strains and where they are found

food and applied food/water safety mechanisms. Typical cases involve 1 to 3 weeks of debilitating symptoms and return to duty may require a month or more. There is no specific antiviral therapy for acute hepatitis E nor a vaccine.

6.1.6 Polio

Polio (poliomyelitis) is a highly-infectious viral disease caused by an *Enterovirus*. It can affect the brain and spinal cord. It ranges in severity from asymptomatic, to mild, to paralytic. Despite a concerted global eradication campaign, the poliovirus continues to affect children and adults in Afghanistan. Reportedly, Iraq has been free of wild poliovirus since 2014. The virus is transmitted 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% of people have a very severe illness leading to muscle weakness, difficulty breathing, paralysis, and sometimes death. People who are asymptomatic can still pass the virus to others and make them sick.

Commented [A39]: Ensure the content here is appropriate for your POEMS location(s).

6.2 Arthropod Vector-Borne Diseases

During the warmer months, arthropod vectors are typically found and, depending on the location, may include mosquitoes, ticks, mites, etc. When arthropod-borne diseases are present, transmission is expected to be sustained countrywide (including in urban areas). Mosquito-borne diseases of note are detailed below. Mitigation strategies involve good preventive medicine practices. Reducing exposure to biting arthropods is accomplished via the use of proper wear of permethrin-treated uniforms, application of insect repellent to exposed skin (e.g., DEET, picaridin), use of pyrethroid treated bed netting, and employment of appropriate chemoprophylaxis (notably for malaria). Animal contact diseases (e.g., rabies) pose a year-round risk. When rabies is present, those at high risk should get pre-exposure rabies vaccination. All personnel should practice avoidance with local wild or domesticated animals and not make pets of local animals.

Higher altitudes and colder temperatures may inhibit insect vector populations. For example, malaria risk zones are absent at high altitudes and in colder seasons. Mitigation strategies included a self-service station for dispensing of insect repellents. Personnel are also prescribed chemoprophylaxis. Mitigation strategies 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 use of environmental controls. [Include any/all of these mitigation strategies as appropriate for your location(s).]

6.2.1 Crimean-Congo hemorrhagic fever (CCHF)

Crimean-Congo hemorrhagic fever is caused by infection with a tick-borne virus (Nairovirus) that is transmitted by the bites of *Ixodid* (hard) ticks. The onset of CCHF is sudden, with initial signs and symptoms to include headache, high fever, back pain, joint pain, stomach pain, and vomiting. As the illness progresses, large areas of severe bruising, severe nosebleeds, and

uncontrolled bleeding at tick bite sites can be seen. Fatality rates occur even in hospitalized patients. Treatment for CCHF is supportive care. There are no effective medications to treat it. Recovery is slow and long-term effects are unknown. There is no safe and effective vaccine currently available for human use. Preventive measures include tick repellent and screening for ticks.

6.2.2 Leishmaniasis - Cutaneous and Visceral

Leishmaniasis is caused by protozoan parasites which are transmitted by the bite of infected female phlebotomine sandflies. The female sandflies feed on blood, typically at night, to produce eggs. There are three main forms of leishmaniasis: visceral (the most serious form because it is almost always fatal without treatment), cutaneous (the most common, usually causing skin ulcers), and mucocutaneous (affecting mouth, nose, and throat). Clusters of affected personnel may arise when there are groups of personnel exposed to heavily infected sandflies in focal areas. The most common form of the disease is cutaneous leishmaniasis, with skin sores that can change in size and appearance over time. The symptoms of visceral leishmaniasis are fever; weight loss; enlarged spleen and liver; and low red blood cell count, platelet count, and white blood cell count. Some people may have no symptoms. Visceral disease can cause severe febrile illness which typically requires hospitalization with convalescence over 7 days; it is mostly fatal without treatment. Control methods include insecticide spray, use of insecticide-treated nets, environmental management, and personal protection (including insect repellent on the skin, and permethrin on uniforms and clothing). Seventy animal species, including humans, can be the source of *Leishmania* parasites.

6.2.3 Sandfly Fever

Sandfly fever (aka, Phlebotomus fever, Pappataci fever) is a vector-borne acute febrile illness transmitted by phlebotomine sandflies. It occurs more commonly in children, though adults are still at risk. Sandfly fever is caused by viruses within the Naples virus (SFNV) species. Sandfly fever disease is a common viral illness that is typically a self-limited illness. While it can be debilitating, it is not lethal. There is no vaccine nor specific therapy available, and clinical management consists of supportive care. Preventive measures include use of insecticides (spraying breeding grounds, living/sleeping areas, screens and around doors and windows); insect repellents on skin and uniform; avoiding outdoor activities after dusk where possible; and covering skin with clothing where possible. Mosquito nets may not be sufficient to prevent sandfly bites as sandflies are much smaller than mosquitoes and can pass through 18-mesh squares. Note that phlebotomine sandflies transmit both Sandfly fever and Leishmaniasis.

6.2.4 West Nile Fever

West Nile fever is caused by a flavivirus that is maintained in bird reservoirs and causes periodic outbreaks in humans and animals. Multiple species of *Culex* mosquitoes can transmit the infection to humans. In many parts of the world, symptomatic cases are typically undiagnosed and unreported. Most infections in young, healthy adults are asymptomatic, although fever, headache, tiredness, body aches (occasionally with a skin rash on trunk of body), and swollen lymph glands can occur. Older individuals and those with underlying medical conditions are at greater risk for severe disease (meningitis, encephalitis, flaccid

paralysis) that may involve prolonged recovery. A febrile illness requiring 1–7 days of inpatient care, followed by return to duty is typical. Fatalities, while rare, may occur.

6.2.5 Typhus-murine (flea-borne)

Flea-borne typhus is a disease caused by *Rickettsia typhi* bacteria. It is a significant cause of febrile illness in local populations that are exposed to rodents (particularly rats) and flea bites and feces. Fleas can pass on the infection transovarially, which helps maintain the cycle of infection. Common symptoms include high fever, headache, chills, tiredness, and muscle aches. About half of people who are infected develop a flat red rash that begins on the back, chest, and stomach and then spreads to the rest of the body, except for the face, palms, and soles. The disease can cause debilitating febrile illness typically requiring 1 to 7 days of supportive care, followed by return to duty. Treatment with an appropriate antibiotic is essential to prevent complications and fatalities. Contact with fleas is prevented by using insect and rodent avoidance (e.g., keeping areas free of trash, sealing up holes in dwellings, and trapping rats and mice). There is no vaccine to prevent flea-borne typhus.

6.2.6 Typhus-mite borne (scrub typhus)

Mite-borne typhus is a disease caused by a bacterium called *Orientia tsutsugamushi*. Scrub typhus is spread to people through bites of infected chiggers (larval mites). It is a significant cause of febrile illness in local, rural populations that are exposed to trombiculid mites (chiggers) in their larval stage. These mites are typically found in areas of grassy or scrubby vegetation, often in areas which have undergone clearing and regrowth. Habitats vary widely and include sandy beaches, mountain deserts, cultivated rice fields, and rain forests. The disease can cause debilitating febrile illness typically requiring 1 to 7 days of supportive care, followed by return to duty. The most common symptoms of scrub typhus include fever, headache, body aches, and sometimes rash. People with severe illness may develop organ failure and bleeding, which can be fatal if left untreated. Antibiotics are most effective if given soon after symptoms begin. Those who are treated early usually recover quickly. No vaccine is available to prevent scrub typhus. Prevention is by using insect repellent and treated clothing.

6.2.7 Malaria

Malaria is a mosquito-borne disease caused by *Plasmodium* parasites of several different species (*P. falciparum*, *P. vivax*, *P. ovale*); the most serious is *P. falciparum*. The female *Anopheles* mosquito bites to take a blood meal for its egg production. Malaria incidents are often associated with the presence of agriculture activity, including irrigation systems and standing water, which provide breeding habitats for vectors. Cases may occur among personnel when exposed to infected *Anopheles*. Prevention requires the use of chemoprophylaxis, treated bed netting, treated uniforms/clothing, and insect repellents. Malaria infection 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. Fatalities may occur, mostly with *P. falciparum* malaria without treatment. Emergence of resistance to chemoprophylactic drugs has become widespread. A vaccine is not available; however, treatment is usually effective.

6.2.8 Dengue Fever

Dengue fever is transmitted by infected *Aedes spp. Mosquitoes*, which are day-biting mosquitos that often breed in artificial containers such as flowerpots or discarded tires. These mosquitoes also spread Zika, chikungunya, and other viruses. Dengue is a flavivirus that causes health outcomes that can range from asymptomatic infection or mild illness to severe disease. The spectrum of disease is dengue fever and severe dengue (dengue hemorrhagic fever and dengue shock syndrome). Dengue infection may require 1–7 days of inpatient care; however, severe dengue is a medical emergency that requires immediate medical care at a clinic or hospital. There is no specific medication to treat dengue infection. A vaccine to prevent dengue is licensed and available in some countries for people aged 9 to 45 years; however, the vaccine should only be given to persons with confirmed previous dengue virus infection and not to those who have never had dengue. If traveling to areas with risk of dengue, steps should be taken to avoid mosquito bites. Dengue is caused by one of any of four related viruses: Dengue virus 1, 2, 3, and 4. Therefore, a person can be infected with a dengue virus as many as four times in his or her lifetime.

6.2.9 Yellow Fever

Yellow fever is transmitted by infected *Aedes spp.* and other mosquitos (e.g., *Haemogogus spp.*) that may transmit infection between primates and humans. The different mosquito species live in different habitats—some breed around houses (domestic), others in the jungle (wild), and some in both habitats (semi-domestic). Yellow fever is an acute viral hemorrhagic disease caused by a flavivirus. Yellow fever is a potentially severe disease that may require intensive care. Mortality rates may be 20–80% in hemorrhagic cases. Yellow fever is prevented by an extremely effective and safe vaccine. A single dose of yellow fever vaccine is sufficient to grant sustained immunity and life-long protection against yellow fever disease, and a booster dose of the vaccine is not needed. In those who become infected, good supportive treatment in hospitals improves survival rates. There is currently no specific anti-viral drug for yellow fever.

6.2.10 Chikungunya

Chikungunya is transmitted primarily by infected *Aedes aegypti* (a morning- and evening biting mosquito), and possibly *Aedes albopictus* (a day biting mosquito). Chikungunya causes a debilitating febrile illness typically requiring 1–7 days of inpatient care, followed by return to duty. In some cases, joint pain severe enough to limit activities may persist for weeks to months. There is no specific treatment for Chikungunya and no preventive vaccines; however, hospitalizations are uncommon, and deaths are rare.

6.2.11 Zika

Zika is a flavivirus spread by daytime biting mosquitos, such as infected *A. aegypti* and *A. albopictus*. Zika infection is generally asymptomatic but can cause a debilitating febrile illness, which typically requires 1–7 days of inpatient care, followed by return to duty. Symptoms of Zika infection (e.g., fever, rash, joint and muscle pain, red eyes, and vomiting) may last for several days to a week. In some cases, severe neurological complications (e.g., Guillain-Barre

syndrome, neuropathy, and myelitis) may occur. The greatest concern is that Zika virus infection during pregnancy can cause offspring to be born with microcephaly and other congenital malformations, known as congenital Zika syndrome. Infection with Zika virus is also associated with other complications in pregnancy including preterm birth and miscarriage. Prevention is with mosquito avoidance. There is no specific medication or vaccine for Zika virus.

6.2.12 Rickettsioses, Tick-borne (spotted fever group)

Spotted Fever Group Rickettsioses (SFGR) are a group of diseases caused by closely related bacteria spread to people through the bites of infected ticks and mites, with ticks being responsible for the most serious of the SFGR. Rickettsioses are transmitted by multiple species of hard ticks, including *Rhipicephalus spp.* and *Ixodes spp.* Spotted fevers can range from relatively mild infections to fatal disease. More prolonged and severe infections may occur with rare fatalities. There are no vaccines; however, antibiotics are available for treatment.

6.2.13 Rift Valley Fever

Rift Valley Fever (RVF) is caused by a *Phlebovirus* virus transmitted by infected mosquitoes (*Aedes spp.* and *Culex spp.*) and rarely from other biting insects. It occurs when people are near livestock, typically in rural settings. While it is most commonly seen in animals, people can get RVF through contact with blood, body fluids, or tissues. RVF ranges in severity from mild and self-limited to a debilitating febrile illness. It is fatal in half of cases. For mild cases, supportive care of 1–7 days, followed by return to duty is expected. Retinopathy sometimes leading to blindness may occur in up to 10% of patients. Severe complications including hepatitis with hemorrhage and encephalitis may occur, leading to fatalities. There is no treatment other than supportive care and no vaccines.

6.2.14 Sindbis (and Sindbis-like viruses)

Sindbis virus is an alphavirus that is related to the Chikungunya alphavirus. Sindbis virus is one of the most widely distributed mosquito-borne viruses in the world, transmitted by *Culex spp.* and other mosquitoes. The risk of encountering Sindbis virus is elevated during periods of increased vector mosquito activity. Sindbis virus causes a mild fever that is associated with a rash and arthritis. Most people recover within weeks to months. Arthralgia can persist for several weeks or more in some cases. There are no specific treatments nor vaccines.

6.2.15 O'nyong-nyong

O'nyong-nyong virus is a mosquito-borne alphavirus belonging to the family *Togaviridae* and alphavirus genus. It is closely related to Chikungunya virus. O'nyong-nyong virus is spread to people by the bite of an infected *Anopheles* mosquito. *Anopheles gambiae* and *Anopheles funestus* are the main vectors of O'nyong-nyong virus. O'nyong-nyong virus means joint-breaker, and common symptoms include high fever, crippling pain in multiple joints, pruritic rash, swollen lymph nodes, eye pain, conjunctivitis (red eyes) with no discharge, oral ulcers, chest pain, and general malaise. The symptoms can be misdiagnosed as Chikungunya virus.

The infection will usually resolve on its own. Some patients experienced prolonged joint pain during the recovery phase. There are no vaccines, no specific treatments, and no prophylaxis. Treatment is symptomatic, and recovery can be expected within 1–2 weeks of clinical onset of symptoms. No deaths from this virus have been reported.

6.3 Water Contact Diseases

Tactical operations or recreational activities that involve extensive contact with surface fresh water, such as lakes, streams, rivers, or flooded fields, may result in significant exposure to leptospirosis and schistosomiasis. These diseases can debilitate personnel for variable periods of time. Leptospirosis 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 exposure to enteric diseases including 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 including bacterial or fungal dermatitis. Mitigation strategies were in place and included avoiding water contact and recreational water activities, proper wear of uniform (including footwear), and protective coverings for cuts/abraded skin.

6.3.1 Schistosomiasis

Schistosomiasis (bilharzia) is an acute and chronic parasitic disease caused by parasitic worms [blood flukes (trematode worms)] of the genus *Schistosoma*. Waterborne transmission occurs when larval cercariae, found in contaminated bodies of freshwater, penetrate the skin. Humans are the principal reservoir for schistosomes and shed schistosome eggs in their urine or feces, thereby contaminating freshwater sources. When water temperatures are at or above 68 degrees Fahrenheit (°F), the eggs hatch in freshwater, releasing larvae. If a suitable freshwater snail species is present, the larvae penetrate the snail and, after a period of development, emerge as free-swimming cercariae. Cercariae infect human hosts by penetrating skin, usually while the person is wading or swimming in freshwater bodies such as lakes, streams, or irrigated fields which were frequently contaminated with human and animal waste containing schistosome eggs. Mild infections of Schistosomiasis are generally asymptomatic. In heavy acute infections, a febrile illness (acute schistosomiasis) may occur. The three main species infecting humans are *S. japonicum*, *S. mansoni*, and *S. haematobium*. Hospitalization may be required, and convalescence may be prolonged. Symptoms of schistosomiasis are not caused by the worms themselves but by the body's reaction to the eggs. Many infections are asymptomatic. The classic sign of urogenital schistosomiasis is hematuria (blood in urine). Kidney damage, bladder and ureter fibrosis, and bladder cancer can occur in advanced cases. In women, urogenital schistosomiasis may present with genital lesions, vaginal bleeding, vulval nodules, and painful coitus. In men, urogenital schistosomiasis can induce pathology of the seminal vesicles, prostate, and other organs. This disease may also have other long-term irreversible consequences, including infertility. There are no vaccines, and treatment may include praziquantel.

6.3.2 Leptospirosis

Leptospirosis (Weil's Disease) is a disease caused by bacteria of the genus *Leptospira* that infected animals spread through their urine. Leptospirosis can occur from exposure to soil or freshwater (river, canal, lake) that contains infected urine, which can enter the mouth, eyes, or a cut during swimming, fishing, wading, or contact with infected animals. Some people with leptospirosis will not have symptoms. When symptoms do occur, they can include fever, headache, chills, muscle aches, vomiting, jaundice, red eyes, stomach pain, diarrhea, and sometimes a rash. Without antibiotic treatment, kidney and liver damage may occur. To reduce risk of infection, promptly clean wounds with clean water, quickly shower if in contact with contaminated water, wear protective clothing, do not touch dead animals with bare hands, and do not drink untreated freshwater from rivers, canals, or lakes. Leptospirosis is treated with antibiotics, such as doxycycline or penicillin. There is no vaccine approved in the United States to prevent leptospirosis.

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 from 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 (e.g., barracks, ships) 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 included routine medical screenings, vaccinations, enforcing space allocation in housing units, implementing head-to-toe sleeping in crowded housing units, implementing proper personal protective equipment (PPE) when necessary for healthcare providers and detention facility personnel, and prompt isolation and treatment of those with infections.

6.4.1 Tuberculosis (TB)

TB is caused by bacteria of genus *Mycobacterium*, which is spread primarily in the air to others when coughing, speaking, or singing. TB bacteria in the lungs can move through the blood to infect other parts of the body, such as the kidney, spine, and brain. Symptoms of TB disease in the lungs include cough, pain, weakness, weight loss, chills, fever, and night sweats. Although a TB vaccine (bacille Calmette-Guerin/BCG) does exist, it is not approved for use in the U.S. due to its limited effectiveness in adults. BCG is used in many countries with a high prevalence of TB to prevent childhood tuberculous meningitis and miliary disease. TB can be prevented with communicable disease control measures and treatment of latent TB. Treatment is with multiple simultaneous antibiotics, possibly for 4–6 months or longer. Multidrug-resistant TB (MDR-TB) and extensively drug-resistant TB (XDR-TB) are more difficult and prolonged to treat.

6.4.2 Middle East Respiratory Syndrome (MERS)

The MERS coronavirus (MERS-CoV) is genetically similar to bat coronaviruses and has been detected in camels in North Africa and the Arabian Peninsula. Evidence suggests that the virus

can be spread from person-to-person among close contacts. MERS causes a wide clinical spectrum of MERS-CoV infection ranging in severity from asymptomatic infection to milder illness to a severe illness, with a rapidly progressive pneumonitis, respiratory failure, septic shock, and multi-organ failure, resulting in death. At hospital admission, common signs and symptoms include fever, chills/rigors, headache, non-productive cough, dyspnea, and myalgia. Other symptoms can include sore throat, coryza, sputum production, dizziness, nausea, and vomiting, diarrhea, and abdominal pain. Prevention consists of frequent handwashing; avoiding touching the eyes, nose, and mouth; and avoiding contact with sick people. The World Health Organization (WHO) recommends avoiding contact with camels, drinking raw camel milk or raw camel urine, and not consuming undercooked meat, particularly camel meat. No vaccine or specific treatment for MERS is currently available.

6.4.3 COVID-19

[Include this for POEMS 2020-]

According to the CDC, COVID-19 is a coronavirus caused by SARS-CoV2, with a high level of transmissibility and infectivity. The incubation period for COVID-19 is 3–14 days from exposure. Symptoms can include fever, cough, shortness of breath, fatigue, muscle and body aches, headache, loss of taste or smell, nausea, and diarrhea. Severe cases may develop, with multi-organ injury necessitating hospitalization. Since December 2020, the Food and Drug Administration authorized several vaccines in the U.S. for decreasing the likelihood of hospitalization and death. The vaccines do not significantly reduce transmission. Oral antiviral treatments are available including nirmatrelvir with ritonavir (Paxlovid™) or molnupiravir (Lagevrio™), and intravenous remdesivir (Veklury™), which are used to treat those at risk for progression to severe COVID-19.

6.4.4 Hantavirus

Hantavirus infections are part of the broad group of eight viral hemorrhagic fevers. Hantavirus infection in humans causes two main types of serious illnesses, both of which can be fatal: HPS/Hantavirus Pulmonary Syndrome (also called HCPS/Hantavirus Cardiopulmonary Syndrome) that is endemic in the Americas, and HFRS/Hemorrhagic Fever with Renal Syndrome that occurs in Europe and Asia. All hantavirus strains can produce symptoms that range from asymptomatic to severe forms of the disease. Hantavirus is spread through the air via inhalation of aerosolized rodent excrement or by eating food contaminated with urine or droppings from rodents. Less frequently, an infected rodent bite can cause infection. Hantavirus can cause organ damage, especially to the lungs, kidneys, and blood vessels. Symptoms of Hantavirus usually develop 2 to 4 weeks after infection but can occur as early as 1 week. Symptoms can include fatigue, fever, muscle aches, headaches, dizziness, chills, nausea, vomiting, diarrhea, and abdominal pain. Complete recovery can take weeks to months. HFRS has very low morbidity (anywhere from <1% to 15%, depending on the viral strain); in contrast, the mortality for HPS is up to 40%. There is no chronic hantavirus infection. There are no vaccines to prevent Hantavirus disease. Personnel can protect themselves by avoiding rodents and their droppings. Prevention is by rodent control which consists of sealing up holes and gaps in dwellings, warehouses, and garages; placing traps to decrease rodent infestation; cleaning up any easy-to-get food, and properly storing food. Cleanups should be

done wearing PPE (N95 respirator and protective clothing), wet mopping with disposable mops (i.e., not dry brooming droppings), disposing of contaminated material in plastic bags that are sealed, and thoroughly washing hands with soap and water after removing the gloves.

6.4.5 Measles

Measles is a member of the genus *Morbillivirus* in the *Paramyxoviridae* family. Humans are the only natural hosts of measles virus. Measles is one of the most contagious of all infectious diseases; up to 9 out of 10 susceptible persons with close contact to a measles patient will develop measles. The virus is transmitted by direct contact with infectious droplets or by airborne spread of droplet nuclei when an infected person breathes, coughs, or sneezes. Measles virus can remain infectious in the air for up to 2 hours after an infected person leaves an area. Infected people are usually contagious from 4 days before until 4 days after rash onset. Symptoms include prodromal fever that can rise as high as 105°F, conjunctivitis, coryza (runny nose), cough, and small spots with white or bluish-white centers on an erythematous base on the buccal mucosa (Koplik spots). Common complications include otitis media, bronchopneumonia, laryngotracheobronchitis, and diarrhea. Rarely, acute encephalitis (resulting in permanent brain damage), and respiratory and neurologic complications may ensue. A rare but fatal central nervous system degenerative disease known as SSPE (Subacute sclerosing panencephalitis) may occur that is characterized by behavioral and intellectual deterioration and seizures; this disease develops 7–10 years after measles infection. An effective vaccine is available to prevent measles. People exposed to measles who cannot readily show that they have evidence of immunity against measles should be offered post-exposure prophylaxis (PEP), with either MMR vaccine within 72 hours of initial measles exposure or immunoglobulin (IG) within 6 days of exposure. The MMR vaccine and IG should not be administered simultaneously, as this practice invalidates the vaccine. There is no specific antiviral therapy for measles, only supportive care. Secondary bacterial infections may arise. Infected people should be isolated for 4 days after they develop a rash; airborne precautions should be followed in healthcare settings.

6.4.6 Meningococcal meningitis

The bacterium *Neisseria meningitidis* causes Meningococcal Meningitis. There are multiple serogroups of *Neisseria meningitidis*. In children and teens, meningococcus is the most common cause of bacterial meningitis, while in adults, it is the second most common cause. The disease is transmitted from person-to-person through droplets of respiratory or throat secretions. Close and prolonged contact facilitates the spread of this disease. Humans are the only host. Common symptoms and signs include sudden high fever; severe, persistent headache; neck stiffness; nausea or vomiting; photophobia; altered mental status; joint pain; rash (reddish or dark purple skin rash known as petechiae) and septicemia. As many as 10–15% of people with meningococcal disease will die, and about 1 in 5 who survive are left with long-term disabilities such as loss of limb(s), deafness, nervous system problems, and brain damage (i.e., Meningococcal meningitis). Several vaccines are available to prevent meningococcal meningitis. Antibiotics may include cephalosporins or penicillins.

6.5 Animal-Contact Diseases

6.5.1 Rabies

Rabies virus is a *Lyssavirus*. Rabies is transmitted by exposure to the virus-laden saliva of an infected animal (e.g., dog, cat, or wildlife), typically through bites, but could occur from scratches contaminated with the saliva. There are five general stages recognized in humans: incubation, prodrome (early symptoms), acute neurologic period, coma, and death. The incubation period is exceptionally variable, ranging from fewer than 10 days to longer than 2 years, but is usually 1–3 months. Rabies affects the central nervous system and is therefore called a neurotropic virus. Symptoms include weakness or discomfort, fever, and headache. As time progresses, an infected person may become delirious, hallucinogenic, and unable to swallow. Without appropriate medical care, rabies causes brain disease and death. An effective vaccine is available in the U.S. to prevent rabies. It is used for both pre-exposure and/or post-exposure prophylaxis. However, once symptoms develop, there is no cure as there is no antiviral rabies treatment. Control of this zoonotic disease is by vaccination of susceptible animal species (particularly dogs and cats), vaccination of personnel who are at high risk, and avoidance of stray and wild animals. Post-exposure prophylaxis is essential and consists of the combination of local wound cleansing, human rabies immune globulin (HRIG), and rabies vaccine.

6.5.2 Q-Fever

Q-fever is caused by infection with the bacterium *Coxiella burnetii*. Cattle, sheep, and goats can be infected, and the bacteria are excreted in milk, urine, and feces of infected animals and during birthing. The organism is extremely hardy and resistant to heat, drying, and many common disinfectants, and it can survive for long periods in the environment. Exposure usually occurs by inhalation of these organisms from air that is contaminated by excreta of infected animals. Rarely, other modes of transmission may be involved including tick bites, ingestion of unpasteurized milk or dairy products, and person-to-person transmission. People are very susceptible to the disease and very few organisms may be required to cause infection. About half of people infected with Q-fever will develop symptoms. Acute symptoms develop 2–3 weeks after exposure and may include high fever, fatigue, severe headache, chest pain, vomiting, diarrhea, abdominal pain, weight loss, and non-productive cough. Chronic Q-fever occurs in <5% of acutely infected patients, and it may present within weeks after an acute infection or may manifest many years later. Endocarditis is the most identified manifestation of chronic Q-fever and is fatal if untreated. Treatment can include doxycycline antibiotics. Vaccines for Q-fever are not available in the U.S., but risk of infection can be reduced by avoiding contact with animals, avoiding consumption of raw milk, and avoiding exposure to contaminated environments. Animals can be infected with *Coxiella burnetii* and appear healthy.

6.5.3 Anthrax

Anthrax is a serious infectious disease caused by *Bacillus anthracis*. Under certain conditions, spores form that are highly resistant and are capable of persisting and retaining their virulence for many years. People can get infected with anthrax if they come in contact with infected

animals or contaminated animal products. Rare cases could occur among personnel with occupational-type exposure to domestic and wild animals grazing on contaminated land (including cattle, sheep, goats, horses, pigs, water buffalo, antelopes, elephants, giraffes, and zebras, or exposure to contaminated animal hides or wool products from these species), as well as handling or consumption of undercooked infected meat. Anthrax in humans occurs as a cutaneous, pulmonary, or intestinal infection. Cutaneous anthrax is the most common but least dangerous form; it presents as a boil-like skin lesion that eventually forms an ulcer with a black center (painless eschar), typically requiring 1 to 7 days of supportive care, with return to duty. Gastrointestinal anthrax occurs by eating anthrax-infected meat and is characterized by diarrhea, potentially with blood; abdominal pains; acute inflammation of the intestinal tract; and loss of appetite. Occasional vomiting of blood can occur. After invading the gastrointestinal system, it spreads to the bloodstream and throughout the body, while continuing to make toxins. It requires hospitalization and is fatal if untreated. Inhalation anthrax usually develops within a week after exposure but may take up to 2 months. During the first few days of illness (prodromal phase) most people have fever, chills, and fatigue, and may be accompanied by cough, shortness of breath, chest pain, and nausea or vomiting. Over the next few days, shortness of breath, cough, and chest pain become more common, and complaints not involving the chest such as nausea, vomiting, altered mental status, sweats, and headache develop in about 1/3 of people. Altered mental status or shortness of breath marks the fulminant phase of illness. Hemorrhagic mediastinitis is nearly pathognomonic for inhalation anthrax. The second (pneumonia) stage occurs when the infection spreads from the lymph nodes to the lungs. Symptoms of the second stage develop suddenly within hours or days after the first stage. Symptoms include high fever, extreme shortness of breath, shock, and rapid death within 48 hours in fatal cases. Inhalation anthrax is very severe, often requiring intensive care with potential fatalities occurring even in treated cases. The likelihood of naturally acquired inhalation (pulmonary) anthrax is remote, though concerns exist over its potential use in weaponized form as a deliberate bioterrorism agent. Mitigation strategies in place include avoiding contact with livestock or consumption of undercooked meat and prophylactic vaccination. Treatment is with prolonged antibiotics and a combination of antibiotics and antitoxin for inhalation anthrax.

6.5.4 H5N1 avian influenza

Influenza A virus subtype H5N1 (A/H5N1) is a subtype of the influenza A virus. It can cause illness in many animal species and rarely in humans. There are two varieties of H5N1 in birds. One variety is Low Pathogenic Avian Influenza H5N1 (LPAI H5N1), also called "North American" H5N1. In most cases, LPAI H5N1 causes minor sickness or no noticeable signs of disease in birds. It is not known to infect humans. The other variety, which is more alarming, is HPAI A(H5N1) for Highly Pathogenic Avian Influenza virus of type A subtype H5N1. These bird-adapted influenza A viruses are commonly known as Avian Influenza ("bird flu"). It is epizootic (maintained in animal populations) in many bird populations. Although avian influenza is easily transmitted among birds, bird-to-human transmission is extremely inefficient. Human-to-human transmission appears to be exceedingly rare, even with close contact. Exposure could result in very severe illness with a fatality rate of 50–60% in symptomatic cases. Due to the high lethality (greater than 90%) and virulence of HPAI A(H5N1), as well as its endemic presence, increasingly large host reservoir, and significant ongoing mutations, it is considered to be the world's largest pandemic threat. Many species of wild and captive

mammals have become infected with H5N1 (including mink, zoo animals, seals, pets, etc.). Humans who become infected may have symptoms that include fever, cough, sore throat, muscle aches, conjunctivitis, and, in severe cases, breathing problems and pneumonia that may be fatal. Mitigation strategies included avoidance of birds/poultry and proper cooking temperatures for poultry products. There are no human vaccines and no specific effective antiviral treatment, though there are candidate antivirals and vaccines.

6.6 Aerosolized Dust or Soil-contact Diseases

6.6.1 **Soil-transmitted helminth (STH) infections are caused by different species of intestinal parasitic worms.** The main species that infect people are the roundworm (*Ascaris lumbricoides*), the whipworm (*Trichuris trichiura*), and hookworms (*Necator americanus* and *Ancylostoma duodenale*). These STH species are normally addressed as a group because they need similar diagnostic procedures and respond to the same medications. STH infections are among the most common infections worldwide, with an estimated 1.5 billion infected people (24% of the world's population). These infections affect the poorest and most deprived communities. These communities have poor access to clean water, sanitation, and hygiene in tropical and subtropical areas, with the highest prevalence reported from sub-Saharan Africa, China, South America, and Asia. There is no direct person-to-person transmission or infection from fresh feces because eggs passed in feces need about 3 weeks to mature in the soil before they become infective. Hookworm eggs hatch in the soil, releasing larvae that mature into a form that can actively penetrate the skin. People become infected with hookworm primarily by walking barefoot on the contaminated soil.

Ascaris and whipworm can also be transmitted by hand-to-mouth when hands are infected with contaminated dirt or by consuming vegetables or fruits that have not been cooked or washed. Heavy infections cause abdominal pain, diarrhea, blood and protein loss, and rectal prolapse.

Morbidity is related to the number of worms harbored. People with infections of light intensity (few worms) usually do not suffer from the infection. Heavier infections can cause a range of symptoms including intestinal manifestations (diarrhea and abdominal pain), malnutrition, general malaise and weakness, and impaired growth and physical development of children.

Soil-transmitted helminth infections are treatable with anti-parasitic medication including albendazole, mebendazole, and ivermectin. Infections of very high intensity can cause intestinal obstruction that should be treated surgically.

Threadworm (*Strongyloides stercoralis*) is an additional intestinal helminth that is typically considered separately from other soil-transmitted helminths as it has peculiar characteristics. An estimated 30–100 million people are infected worldwide. It has the unique ability to develop to adulthood in soil as well as in the human intestine. Unlike other soil-transmitted roundworms, *S. stercoralis* is capable of autoinfection, which can result in chronic disease lasting decades, or cause overwhelming hyper-infection (with dissemination through the bloodstream, lungs, central nervous system, and other organs). Findings of Strongyloidiasis include abdominal pain and diarrhea, rash, pulmonary symptoms (including cough and wheezing), and eosinophilia, as the worms pass through the lungs. This parasite is not sensitive to albendazole or mebendazole but is sensitive to ivermectin.

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A unique form of cutaneous larva migrans is specific to strongyloidiasis, *Larva currens*. It results from autoinfection. The eruption usually begins in the perianal region and is accompanied by intense pruritus (severe itching of the skin). Typically, it causes erythematous (reddening of the skin), urticarial skin lesions that are linear or serpiginous, in which the worms rapidly migrate (up to 10 cm/hour) within the skin. There are currently no vaccines.

6.6.2 Lassa fever

Lassa fever is an acute viral hemorrhagic illness caused by Lassa virus, a member of the *Arenavirus* family of viruses. Humans usually become infected with Lassa virus through exposure to food or household items contaminated with urine or feces of infected *Mastomys* mice or rats. The disease is endemic in the rodent population in parts of **West Africa**. The potential health risk to U.S. personnel is Low year-round (peak transmission period is January through April). Multimammate mice (*Mastomys natalensis*) are the main reservoir for Lassa fever and shed the virus in urine and feces. Lassa fever is transmitted primarily by inhalation of aerosols containing infected rodent urine or feces, although it can also be transmitted by consuming food or water contaminated with rodent urine or feces. Most infections are asymptomatic or self-limited mild illness (80%). About 20% result in severe disease, where the virus affects the liver, spleen, and kidneys. In fatal cases, death usually occurs within 14 days. The overall fatality rate is 1%. **Lassa fever is known to be endemic in Benin, Ghana, Guinea, Liberia, Mali, Sierra Leone, Togo, and Nigeria, but probably exists in other West African countries** as well. Person-to-person infections and laboratory transmission can also occur, particularly in healthcare settings in the absence of adequate infection prevention and control measures. There is currently no licensed vaccine for Lassa fever nor specific antiviral treatments. Prevention of Lassa fever relies on promoting good community hygiene to discourage rodents from entering homes, and storing foodstuffs in rodent-proof containers, disposing of garbage far from the home, maintaining clean households, and keeping cats.

7 Venomous Animals

All information was taken directly from the **Clinical Toxinology Resources website** from the University of Adelaide, Australia (Reference **XX**). The species listed below have home ranges that overlap the location of **Camp XXX** and presented a health risk if they were encountered by personnel. See Section 10 for more information about pesticides and pest control measures.

7.1 Spiders

[Create a country-specific summary list of spiders and their scientific names (when available). Where possible, narrow the list down to the regional list.]

In Afghanistan, there are two known spiders of medical relevance. They are *Latrodectus tredecimguttatus* and *Latrodectus pallidus*.

7.2 Scorpions

[Create a country-specific summary list of scorpions and their scientific names (when available). Where possible, narrow the list down to the regional list.]

Commented [A40]: For spiders and scorpions, and snakes search by Country and click on specific species. Don't include in POEMS if:

- clinical effects don't report envenoming.
- species map doesn't overlap base camp
- species is LOW on the Dangerousness Index (i.e., it doesn't present a health risk)

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In Afghanistan, there are eight scorpions that can cause moderate-to-lethal envenomation: *Androctonus crassicauda* (black scorpion), *Androctonus amoreuxi*, *Hottentotta judaicus*, *Hottentotta saulcyi*, *Isometrus maculatus*, *Leiurus quinquestriatus*, *Nebo hierichonticus*, and *Scorpio maurus*. Thirteen other scorpions are present, but their potential clinical effects are unknown. These are: *Birulatus astartiae*, *Buthacus leptochelys*, *Buthacus macrocentrus*, *Buthacus tadmorensis*, *Buthacus yotvatensis*, *Compsobuthus jordanensis*, *Compsobuthus matthiesseni*, *Compsobuthus wernerii*, *Mesobuthus caucasicus*, *Mesobuthus eupeus*, *Mesobuthus gibbosus*, *Mesobuthus nigrocinctus*, and *Orthochirus scrobiculosus*.

7.3 Snakes

[Create a country-specific summary list of venomous snakes and their scientific names (when available). Where possible, narrow the list down to the regional list.]

In Afghanistan, there are at least 17 venomous snakes, including: Two Cobras and Kraits [*Naja* (Indian Cobra), *Naja oxiana* (Oxus Cobra)]; Two Pit Vipers [*Agkistrodon halys* (Haly's Pit Viper), *Gloydius himalayanus* (Himalayan Pit Viper)]; Six Vipers [*Echis carinatus* (Saw-Scaled Viper), *Echis c. multisquamatus* (Saw-Scaled Viper), *Echis carinatus sochureki* (Saw Scaled Viper), *Eristocophis macmahonii* (Asian Sand Viper), *Pseudocerastes persicus* (Persian Horned Viper), *Vipera lebetina* (Levantine Viper)]; and seven Sea Snakes.

7.4 Short-term health risk:

Low. If encountered, effects of venom vary with species from mild localized swelling to potentially lethal effects. Mitigation strategies included avoiding contact, proper wear of uniform (especially footwear), and timely medical treatment that may require antivenom or antitoxin.

7.5 Long-term health risk:

None identified.

8 Heat/Cold Stress

8.1 Heat

The risk of heat injury in unacclimatized or susceptible personnel varies throughout the year. Heat injuries, from least to most serious include heat rash, heat syncope, heat exhaustion, and heat stroke. Mitigation measures are gradual acclimatization, hydration, work-rest cycles, and cooling facilities. Affected personnel, particularly with serious heat stress injuries, are likely to have sought medical attention and had the event and its medical management recorded in their medical record (e.g., EMR and/or SF 600 paper record).

Summer (month – month) average monthly high temperatures range from XX degrees Fahrenheit (°F) to XX°F, with an average high temperature of XX°F based on historical climatological data from the (fill in the blank and provide Reference). The health risk of heat stress/injury based on temperatures alone is Low (< 78°F) from month to month, Moderate (78-81.9°F) from month to month, High (82-87.9°F) from month to month, and Extremely High

Commented [A41]: Specify where climatological data was obtained. Climates to Travel: world climate guide <https://www.climatestotravel.com>, Weather Spark (weatherspark.com), and 14th Weather Squadron (<https://climate.af.mil/>) are useful sites.

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(≥ 88°F) from **month to month**. However, work intensity and clothing/equipment worn introduce greater risk of heat stress/injury than environmental factors alone (Reference **XX**). Managing risk during hot weather operations included monitoring and enforcing proper work/rest periods, adequate hydration, and taking individual risk factors (e.g., acclimation, weight, and physical conditioning) into consideration. Risk of heat stress/injury was reduced with preventive measures.

8.1.1 Short-term Health Risk:

Low to High, mitigated to Low. The risk of heat injury was reduced to low through preventive measures such as work/rest cycles, proper hydration and nutrition, and monitoring Wet Bulb Globe Temperature (WBGT). Risk of heat injury in unacclimatized or susceptible populations (older, previous history of heat injury, poor physical condition, underlying medical/health conditions), and those under operational constraints (equipment, PPE, vehicles) is **high** from **XX-XX**. Confidence in the health risk estimate is **low** (Reference **XX**, 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 of age), in lesser physical condition, or with underlying medical/health conditions. Long-term health implications from heat injuries are infrequent 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 the health risk estimate is **low** (Reference **XX**, Table 3-6).

8.2 Cold

The risk of cold injury increased during the winter months, particularly in those inadequately prepared for and unacclimatized to cold weather conditions. The range of cold weather injuries are divided into freezing and non-freezing injuries and may include chilblains, immersion foot, frostnip, frostbite, and hypothermia. Interventions are typically rewarming and wound care. Affected personnel, particularly with serious heat stress injuries, are likely to have sought medical attention and had the event and its medical management recorded in their medical record (e.g., EMR and/or SF 600 paper record).

Winter (**month – month**) monthly mean daily minimum temperatures range from **XX**°F to **XX**°F, with an average temperature of **XX**°F. **Because, even on warm days, a significant drop in temperature after sunset by as much as 20°F can occur, there is a risk of cold stress/injury.** 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 **do not drop below freezing. However, personnel may encounter significantly lower temperatures during field operations at higher altitudes.** **[Delete this sentence if there are no higher altitudes for your POEMS location(s).]** As with heat stress/injuries, cold stress/injuries are largely dependent on operational and individual factors instead of environmental factors alone.

Commented [A42]: Provide Justification for Confidence in health risk estimate.

Examples:

1. Low based on meteorological data taken from closest location to base camp location.
2. Medium based on data taken directly from base camp (base camps with airfields may have meteorological data)

8.2.1 Short-term Health Risks:

Low. The short-term risk of cold injury is Low. Confidence in the health risk estimate is **low** (Reference **XX**, Table 3-6).

8.2.2 Long-term Health Risks:

Low. The long-term risk of cold injury is Low. Confidence in the health risk estimate is **low** (Reference **XX**, Table 3-6).

9 Noise

For the protection of all military personnel and noise-exposed civilian personnel from hearing loss resulting from hazardous occupational and operational noise exposure, the DoD set forth a military noise standard for continuous and intermittent (i.e., steady state) noise exposure and for impulse noise (i.e., noise lasting less than one second) exposure. The standard for continuous and intermittent noise is 85 decibels on the A-weighted scale (dBA), as an 8-hour time-weighted average. The A-weighted scale of noise measurement is used because it approximates the human ear's response to sound. The standard for impulse noise sound pressure levels is 140 decibels peak (dBp). All personnel that are exposed to continuous and intermittent noise levels at or above 85 dBA for at least 1 day per year or to impulse noise 140 dBp sound pressure or greater must be enrolled in the hearing conservation program and use hearing protection when indicated (Reference **XX**).

[If flight line and helicopter landing zones exist, include this next paragraph and Noise of Military Weapons and Ground Vehicles, Planes, and Ships 2019 Reference.]

Aircraft operations have the potential to cause significant noise hazard to flight line and helicopter landing zone support personnel. Support personnel working in the flight line area of the aircraft operations may be exposed to noise levels well above 100 dBA, during intermediate and full power runs by fixed wing aircraft. Because of the potential noise hazard inherent in-flight line operations and the helicopter landing zone, personnel are required to wear dual hearing protection (Reference **XX**).

9.1 Continuous

No specific hazard sources were documented in the DOEHRS from **Day Month Year** through **Day Month Year**.

9.2 Impulse

No specific hazard sources were documented in the DOEHRS from **Day Month Year** through **Day Month Year**.

Commented [A43]: Include site specific information. Example: a helicopter landing zone exists 50 meters from personnel at Camp XXX. Sometimes noise levels are reported in OEHSAs for this, generators close to personnel, etc. so include all site-specific information. * If no hazards are identified, use this standard language.

10 Unique Incidents/Concerns

10.1 Potential Environmental Contamination Sources

DoD personnel are exposed to various chemical, physical, ergonomic, and biological hazards while 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 risks associated with these hazards depend on several factors including what materials are used, how long the exposure lasts, what is done to the material, the environment in which the task or operation is performed, and what industrial hygiene and environmental controls are used. The hazards can include exposures to heavy metal particulates and fumes (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 tasks 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 adverse health risks.

10.2 Waste Sites/Waste Disposal

Hazardous waste was collected on the base camp and transported to a hazardous waste disposal site. Contractors collected trash and took it out of the camp to a site about 1 kilometer away. Regulated medical waste (RMW) was disposed onsite using an RMW incinerator (Reference XX).

10.3 Fuel/Petroleum Products/Industrial Chemical Spills

Two jet propellant 8 (JP-8) 10,000-liter fuel tanks were located near the motor pool on the base camp. No spills were documented in the OEHSA (Reference XX).

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 several 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.

10.4.1 Rodenticides

Nothing was found to document how rodent control was performed.

Commented [A44]: Example text. Please customize to the location(s). When known, note the host nation use of pesticides that are banned in the US.

10.4.2 Insecticides

Nothing was found to document how insect control was performed.

10.4.3 Herbicides

Nothing was found to document how weed control was performed.

10.5 Asbestos

No specific hazard sources were documented in the DOEHS from Day Month Year through Day Month Year.

10.6 Lead Based Paint

No specific hazard sources were documented in the DOEHS from Day Month Year through Day Month Year.

10.7 Burn Pit

[Include this section ONLY when a base camp has burn pits/burn barrel or is known to be affected by a nearby non-U.S. burn pit. See example paragraph below.]

Burn pits were not used at Camp XXX during the years XXXX – XXXX. However, an Iraqi burn pit was identified in operation in XXXX and smoke was observed to drift onto the camp. Details of the burn pit location, the materials burned, and the times/durations of burning were not documented.

While emissions from the burning of waste at or near deployment locations will increase concentrations of combustion-related airborne hazards, estimating the relative contribution of those hazards to a specific increase in risk to the health of service members is nearly impossible. Air samples used to support the health risk assessment capture the airborne hazards from all sources at the point of exposure, not only from the burn pit. During contingency operations, the air quality may be affected by combustion sources not typically encountered in a garrison environment (e.g., industry lacking emissions controls, local burning for heating homes and businesses, or combat- or natural disaster-related fires).

The population health risks presented in this POEMS describe—as far as practicable—the risks associated with exposure to the combined hazards that were measured in the ambient air. These risks are from all contributing sources and are not exclusive to burn pit emissions.

Burn pit smoke cannot be evaluated independently from the ambient general air pollution. Burn pit smoke composition varies but of greatest concern are exposures to high levels of PM₁₀ and PM_{2.5} in smoke. Particulate matter 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/or burn pit smoke should have resolved post-deployment, providers should nevertheless consider the

Commented [A45]: Provide site-specific burn pit information to include: burn pit location (on or off-camp), approximate distance to the deployed population, hours of operation (operated daily, weekly, etc.), prevailing wind, inversions, or other factors that affect the potential exposures to the smoke, who operated it, what was burned (US solid waste, other military's waste, local community waste, and/or other items), size/number of burn pits, etc.

Example: One large (approx. 1/2 acre) burn pit was located on the host nation side of the camp, separated from the US side only by concertina wire. All US personnel were housed 500 – 1000 feet from the burn pit. The burn pit was used to dispose of US and HN solid waste and operated from sunrise to sunset daily.

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relationship between deployment exposures and long-term current complaints. Some individuals may have sought treatment for acute respiratory irritation while deployed. Personnel who reported with symptoms or required treatment while at site(s) associated with burn pits should have exposure and treatment noted in the medical record (e.g., EMR and/or on a SF-600 paper record). Concerned or affected service members, veterans, and civilians can seek further medical evaluation. Medical providers should further consider the overall individual health status (e.g., any underlying conditions, an individual's susceptibilities, medications, tobacco usage) and any potential unique individual exposures (such as occupational or specific personal sampling data) when assessing individual concerns.

In a 2011 study of the health effects associated with service in Afghanistan and Iraq during 2001–2009, the Institutes of Medicine (IOM, Reference XX) was unable to determine if exposure to emissions from burn pits was associated with long-term health effects. This was primarily due to significant gaps in environmental monitoring data and health effects reporting. However, the committee's review of the existing literature at the time did suggest that, in general, service in Iraq or Afghanistan could be associated with long-term health effects. For the hazards that they did identify, this would be particularly true for either susceptible (e.g., those with asthma) or highly exposed subpopulations (e.g., those who lived or worked near a burn pit). If these broader conclusions are supported in future health studies, the related health effects of concern will probably be respiratory and cardiovascular effects and cancer. Additionally, the susceptibility to these effects could be exacerbated by other factors such as stress, smoking, local climatic conditions, and co-exposure to other chemicals that affect the same biological or chemical processes.

To follow-up on the 2011 report, the NASEM published a 2020 report, Respiratory Health Effects of Airborne Hazards Exposures in the Southwest Asia Theater of Military Operations, that examined the scientific findings of respiratory health effects from airborne hazards during deployment (Reference XX). A key conclusion in that report was that particulate matter from regional sources was of potential importance. The committee concluded that respiratory symptoms (i.e., shortness of breath, chronic persistent cough, and wheezing) had limited or suggestive evidence of an association with airborne hazards. Additionally, insufficient evidence was available to determine an association to other health outcomes (e.g., pulmonary function changes, respiratory system disease mortality, infectious/non-infectious lower airway occurrences, upper airway disorders, lung disease, and respiratory cancers). These findings do not mean that there is no association between deployment to the Southwest Asia theater and the respiratory health outcomes mentioned above, but instead that the available evidence does not allow a more definitive determination to be made about a potential association.

The 2011 IOM report specifically addressed exposure in Iraq and Afghanistan. While those results are not specific to Camp XXX, Country, the overall conclusions about risks due to environmental exposures at locations with burn pits may be similar. However, any specific conclusions about health risks at this location may differ from other locations as exposures can vary significantly due to differences in the types and amounts of materials burned, the operational processes at the burn pit or incinerator, the local meteorological conditions, the presence of other pollution sources, and many other variables.

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13. Shoreland Travax (Travel Medicine). <https://www.travax.com/>
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15. Modification 14 to United States Central Command Individual Protection and Individual Unit Deployment Policy, October 2019.

Commented [A46]: Check references to make sure they are specific to your POEMS

Commented [A47]: References 1 & 2, Located above Purpose

Commented [A48]: Located in Site Description paragraph

Commented [A49]: Located in Site Description paragraph. Include site specific OEHSAs and Base Camp Assessments (if used)

Commented [A50]: Located under Summary (Figure 1 reference)

Commented [A51]: Located under Summary (2nd paragraph)

Commented [A52]: Section 1 Health Risk Assessment

Commented [A53]: Section 2 Air: GEOS-CF modeled concentrations (if applicable)

Commented [A54]: Sample data/notes section for PM2.5 if applicable (i.e., if have NASA data)

Commented [A55]: Ozone reference, if applicable (e.g., if a health risk due to Ozone is written in Ozone section)

Commented [A56]: Drinking Water section

Commented [A57]: Endemic Diseases section (Select country on website to view diseases)

Commented [A58]: Endemic Diseases section. Access requires an account which is free for DoD providers.

Commented [A59]: Endemic Diseases section (CENTCOM specific references listed as examples). Consider assessment timeframe and use those that are applicable.

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Commented [A67]: AHOBP section

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 Defense Centers for Public Health organization below. Organizations external to DoD should contact Deputy Assistant Secretary of Defense for Health Readiness Policy and Oversight (HRP&O).

Defense Centers for Public Health – Aberdeen (formerly APHC) Phone: 800-222-9698.
<https://ph.health.mil/Pages/default.aspx>

Defense Centers for Public Health – Portsmouth (formerly NMCPHC) Phone: 757-953-0700. <https://www.med.navy.mil/Navy-and-Marine-Corps-Force-Health-Protection-Command/Pages/Home/>

Defense Centers for Public Health – Dayton Phone: 888-232-3764.
<https://www.afrl.af.mil/711HPW/USAFSAM/>

Deputy Assistant Secretary of Defense for Health Readiness Policy and Oversight (HRP&O) Phone: 800-497-6261. <https://www.health.mil/About-MHS/OASDHA/HRPO>