Military Deployment
Periodic Occupational and Environmental Monitoring Summary (POEMS):
Al Udeid Air Base (AUAB), Qatar
Calendar Years: 2004 to 2015

AUTHORITY: This Periodic Occupational and Environmental Monitoring Summary (POEMS) has been developed in accordance with Department of Defense (DoD) Instructions 6490.03, 6055.05, and JCSM (MCM) 0028-07, *See REFERENCES.*

PURPOSE: This POEMS documents the Department of Defense (DoD) assessment of Occupational and Environmental Health (OEH) risk for Al Udeid Air Base (AUAB). It presents a qualitative estimate of population-based health risks identified at this location and their potential medical implications. The report is based on information collected from May 2004 through July 2015 to include deployment OEHS sampling and monitoring data (e.g. air, water, and soil), field investigation and health assessment reports, as well as country and area-specific information on endemic diseases.

This assessment assumes that environmental sampling at AUAB during this period was performed at representative exposure points selected to characterize health risks at the *population–level*. Due to the nature of environmental sampling, the data upon which this report is based may not be fully representative of all the fluctuations in environmental quality or capture unique occurrences. While one might expect health risks pertaining to historic or future conditions at this site to be similar to those described in this report, the health risk assessment is limited to May 2004 through July 2015.

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

Health protective exposure assumptions are used in the assessment of all health risks, i.e. the resident population is assumed to be constantly exposed to environmental conditions. Small groups of personnel assigned to AUAB or the other nearby sites addressed in this summary may be at greater risk than the general population due to operational requirements; these groups are identified when appropriate.

SUMMARY: Conditions with an estimated health risk of Moderate or greater are summarized in Table 1. Table 2 provides population based risk estimates for identified OEH conditions at AUAB. As indicated in the detailed sections that follow Table 2, controls established to reduce health risk were factored into this assessment. In some cases, e.g. ambient air, specific controls are noted, but not routinely available/feasible. *Navigable links have been imbedded in both tables and the discussion sections of the POEMS so that the reader can easily move back and forth between the summary tables and detailed discussions.*

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

Short-term health risks & medical implications:

The following may have caused acute health effects in some individuals ***during deployment*** at AUAB and other military facilities in the immediate vicinity.

Heat injury: The short-term health risk of heat injury for non-acclimatized individuals (i.e. on site less than four weeks) and those with underlying health conditions was **moderate**. For all other individuals the risk was **low**.

Animal Contact: The short-term health risk for Q-fever is estimated to be **moderate**. Precautions can be taken to mitigate this health risk, such as Standard Preventive Medicine measures, as well as COCOM policy, which generally prohibit contact with, adoption, or feeding of feral animals. However, the short-term mitigated health risk is also estimated to be **moderate**.

Arthropod Vector Borne: The short-term risk for sandfly fever, West Nile fever, Crimean-Congo hemorrhagic fever, rickettsioses (tick-borne spotted fever group and murine typhus) and Sindbis is **moderate**. Typical presentation of sandfly fever include symptoms of fever, frontal headache, lethargy, malaise, retro-orbital pain, conjunctivitis, photophobia, nick rigidity, low back pain, myalgia, meningitis, encephalitis, and confusion. West Nile fever presents no symptoms in 70-80% of infected individuals. Individuals who exhibit symptoms may present with cyclic fevers, headaches, body aches, joint pains, vomiting, diarrhea or rash. Crimean-Congo hemorrhagic fever typically presents as sudden onset of headaches, high fever, back pain, joint pain, stomach pain and vomiting; jaundice, hemorrhage and disseminated intravascular coagulation typically follow. Rickettsiosis typically presents with symptoms of fever, headache, fatigue, muscle aches, and may include eschar, and maculopapular rash. Typical presentation of Sindbis includes symptoms of fever, joint pain, rash and malaise.

Water contact: The occurrence of flooding after heavy rainfall can facilitate the spread of leptospirosis already present in the soil. The short-term unmitigated health risk for this is estimated to **moderate**. Precautions can be taken to mitigate this health risk, such as avoidance of fresh water sources, such as puddles/ standing water, drainage areas, etc. and treatment (primarily chlorination) of non-drinking water (water used for bathing, cooking, etc.), however, the short-term mitigated health risk is also estimated to be **moderate**.

Long-term health risks & medical implications:

The following may be associated with long term health effects in some individuals who deployed to AUAB and other military facilities in the immediate vicinity.

Inhalation of dust: Fine particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$) are present in the air in AUAB at moderate concentrations based on sample data collected. The long-term risk related to exposure to $PM_{2.5}$ was **moderate** from 2006-2007. Individuals who routinely worked outdoors during this period and inhaled $PM_{2.5}$ at levels present at the base may have developed health conditions such as chronic bronchitis, reduced lung function and asthma. Individuals with a history of asthma or pre-existing cardiopulmonary disease are likely at greater risk. There are no specific recommended post-deployment medical surveillance evaluations for individuals with particulate exposures. Providers should consider individual health status (e.g., any underlying conditions/susceptibilities) and unique individual OEH exposures (i.e. welding fumes) when addressing individual concerns. Although short-term effects from exposure to dust should have resolved post-development, providers should consider the relationship between potential deployment exposures and current complaints.

Table 2: Population-Based Health Risk Estimates – AUAB, Qatar [1 – 5]

Source of Identified Health Risk[3]	**Unmitigated Health Risk Estimate**[4]	**Control Measures Implemented**[5]	**Residual Health Risk Estimate**[4]
Air			
Particulate matter less than 10 microns in diameter (PM_{10}) (see paragraph 2.3)	Short-term: **Low-High** (as per risk assessment of the data) Daily levels vary, acute health effects (e.g., upper respiratory tract irritation) more pronounced during peak days. More serious effects are possible in susceptible persons (e.g., those with asthma/existing respiratory diseases).	Typical or known control measures within COCOM such as following: Most personnel live and work in air conditioned buildings or tents. For those not working in air condition spaces, minimize time outdoors, and keep doors or tent flaps closed. Use of water for dust control on unpaved roads and work areas.	For particulate matter (PM), control measures have limited efficacy. Thus, the residual risk may be similar or identical to unmitigated risk.
	Long-term: **Health guidelines not defined**		Long-term: **Health guidelines not defined**
Particulate matter less than 2.5 microns in diameter ($PM_{2.5}$) (see paragraph 2.4)	Short-term: *Data exist from 2004-2008 upon which to base a health risk assessment. From 2004-2008, the health risk associated with typical $PM_{2.5}$ exposures was* Low-Moderate**.** The majority of the time, acute health effects such as eye, nose, or throat irritation from exposure was anticipated to have occurred. Mild acute (short-term) health effects were possible for those individuals who spent much of their time outdoors. Existing medical conditions (e.g., asthma or respiratory diseases) may be exacerbated.	Limit strenuous physical activities when air quality is poor, minimize time outdoors, and keep doors, windows and tent flaps closed.	Short-term: **Low-Moderate** For particulate matter (PM), control measures have limited efficacy. Thus, the residual risk may be similar or identical to unmitigated risk).
	Long-term: Insufficient data exist from *2004-2008* upon which to base a health risk assessment. From *2004-2008*, the health risk associated with typical $PM_{2.5}$ exposures was **Moderate**. During periods of **low** risk, no anticipated chronic health effects from $PM_{2.5}$ were anticipated to have occurred. At the **moderate** risk level, a small percentage of individuals may have been at increased risk of developing chronic health conditions. These conditions include reduced lung function, chronic bronchitis, chronic obstructive pulmonary disease (COPD), asthma, and other cardiopulmonary diseases. Those with a history of asthma or pre-existing cardiopulmonary disease have a higher risk for developing these chronic conditions.		Long-term: **Moderate** Small percentage of persons may have been at increased risk for developing chronic conditions (particularly those more susceptible to acute (short term) effects (e.g., those with asthma/existing respiratory diseases).

Table 2: Population-Based Health Risk Estimates – AUAB, Qatar [1 – 5]			
Airborne Metals (see paragraph 2.5)	Short-Term: **Low** Long-term: **Low**		Short-Term: **Low** Long-term: **Low**
Volatile Organic Compounds (VOC) (see paragraph 2.6)	Short-term: **None identified** Insufficient data exist upon which to base a health risk assessment.	Fuel spills cleaned up quickly if they occur.	**None identified** Insufficient data exist upon which to base a health risk assessment.
	Long-term: **None identified**		Long-term: **None identified**
Soil			
Soil (see paragraph 3)	Short-Term: **None Evaluated**: Currently, soil sampling data not evaluated for short Term (acute) Health Risks**.** Long-term: **None identified**	Fuel spills cleaned up quickly if they occur.	Short-Term: **None Evaluated**: Currently, soil sampling data not evaluated for short Term (acute) Health Risks**.** Long-term: **None identified**
Water			
Consumed Water (Water Used for Drinking) (see paragraph 4.2)	Short-term: **Low** US Army Veterinarian Service approved bottled water and packaged water from the Expeditionary Water Packaging System was provided for drinking. No analyte was detected above the 14 day 15L/day negligible drinking water military exposure guidelines.	US Army Veterinary Service approved bottled water and Preventive Medicine/ Army Veterinary approved packaged water were supplied and consumed except for a brief period during the onset of the war. Active and ongoing drinking water surveillance program.	Short-term: **Low**
	Long-term: **Low**. US Army Veterinarian Service approved bottled water and packaged water from the Expeditionary Water Packaging System that is provided for drinking. No analyte was detected above the 14 day 15L/day negligible drinking water military exposure guidelines.		Long-term: **Low**
Water used for other purposes (non-drinking) (see paragraph 4.3)	Short-term: **None identified**	Water surveillance programs which routinely monitor for disinfectant residual and bacteriological contamination	Short-term: **None identified**
	Long-term: **None identified**		Long-term: **None identified**
Military Unique			
Chemical Biological, Radiological Nuclear (CBRN) Weapons (see paragraph 5.1)	Short-term: **None identified**		Short-term: **None identified**
	Long-term: **None identified**		Long-term: **None identified**
Depleted Uranium (DU) (see paragraph 5.2)	Short-term: **Not evaluated** No/insufficient data exist upon which to base a risk assessment		Short-term: **Not evaluated** No/insufficient data exist upon which to base a risk assessment
	Long-term: **Not evaluated** No/insufficient data exist upon which to base a risk assessment		Long-term: **Not evaluated** No/insufficient data exist upon which to base a risk assessment
Ionizing Radiation (see paragraph 5.3)	Short-term: **Low** (based on data)		Short-term: **Low** (based on data)
	Long-term: **Low**(based on data)		Long-term: **Low** (based on data)
Non-ionizing Radiation	Short-term: **Low** (based on data)		Short-term: **Low** (based on data)

Table 2: Population-Based Health Risk Estimates – AUAB, Qatar [1 – 5]			
(see paragraph 5.4)	Long-term: **Low** (based on data)		Long-term: **Low** (based on data)
Endemic Disease			
Gastrointestinal (same as Food borne/Waterborne (e.g., diarrhea-bacteriological) (see paragraph 6.1)	Short-term: Variable, **High**. If ingesting unapproved local food/water, the health effects can temporarily incapacitate personnel (diarrhea) or result in prolonged illness (hepatitis A, typhoid fever, brucellosis, hepatitis E). Viral gastroenteritis can present due to a high rate of personnel turnover and shared dining, berthing, bathroom facilities, and working spaces.	Standard Preventive Medicine measures: immunizations (hepatitis A and typhoid fever), the consumption of food and water from approved sources, and habitability inspections to ensure cleanliness/sanitation.	Short-term: **Low**. Based on disease incident reporting from AUAB, Qatar, bacterial and protozoal gastrointestinal diseases, cholera, brucellosis, and hepatitis E infections present a low risk.
	Long-term: **Low.** The majority of gastrointestinal diseases do not cause prolonged illness.		Long-term: **Low**, based on disease incident reporting from AUAB, Qatar
Arthropod Vector Borne (see paragraph 6.2)	Short-term: Competent vectors and reservoirs for disease are present. Risk is **Moderate** for sandfly fever, West Nile fever, Crimean-Congo hemorrhagic fever, rickettsioses (tick-borne spotted fever group and murine typhus) and Sindbis**.** Appropriately **Low** for malaria and Leishmaniasis.	Standard Preventive Medicine measures: proper wearing of insecticide-treated uniforms and the application of insect repellent to the skin, chemoprophylaxis in accordance with COCOM policy (i.e., malaria), removal of vector harborages within camps, and the application of pesticides.	Short-term: Appropriately **low to none** for malaria and cutaneous leishmaniasis or **Low** for all other vector-borne diseases based on disease incident reporting from AUAB, Qatar.
	Long-term: **Low**, it is possible to be infected during deployment with leishmaniasis, but not to have clinically evident disease until redeployed.		Long-term: **Low** based on disease incident reporting from AUAB, Qatar.
Water-Contact (e.g. wading, swimming) (see paragraph 6.3)	Short-term: **Moderate** The occurrence of flooding after heavy rainfall can facilitate the spread of leptospirosis already present in the soil.	Avoidance of fresh water sources, such as puddles/ standing water, drainage areas, etc. Treatment (primarily chlorination) process for non-drinking water (water used for bathing, cooking, etc.).	Short-term: **Moderate**, based on disease incident reporting from AUAB, Qatar.
	Long-term: **Low** based on disease incident reporting from AUAB, Qatar.		Long-term: **Low** based on disease incident reporting from AUAB, Qatar.
Respiratory (see paragraph 6.4)	Short-term: **Low** for TB The high rate of personnel turnover, shared dining, berthing, recreational facilities, and working spaces may allow for the easy transmission of upper respiratory infections, including influenza.	Influenza immunizations are given either before or during deployment. Local and third country national workers/contractors are required to complete health screening prior to employment. Potential tuberculosis exposure is addressed in the Post Deployment Health Assessment.	Short-term: **Low** for upper respiratory infections and tuberculosis.
	Long-term: **Low**, the majority of respiratory diseases do not cause prolonged illness.		Long-term: **Low** based on disease incident reporting from AUAB, Qatar.

Table 2: Population-Based Health Risk Estimates – AUAB, Qatar [1 – 5]			
Animal Contact (see paragraph 6.5)	Short-term: **Moderate for Q-fever, Low for rabies** based on disease incident reporting from AUAB, Qatar.	Standard Preventive Medicine measures, as well as COCOM policy, generally prohibit contact with, adoption, or feeding of feral animals. Immunizations for anthrax and rabies (rabies vaccination and/or immune globulin given if clinically directed).	Short-term: **Moderate for Q-fever, Low for rabies** based on disease incident reporting from AUAB, Qatar.
	Long-term: **Low** based on disease incident reporting from AUAB, Qatar.		Long-term: **Low** based on disease incident reporting from AUAB, Qatar.
Venomous Animal/ Insects			
Snakes, scorpions, and spiders (see paragraph 7)	Short-term: **Low,** if encountered, effects of venom vary with species from mild localized swelling (e.g. scorpion species *Scorpiops lindbergi*)) to potentially lethal (e.g. saw-scaled viper or *Gloydius halys*) based on disease incident reporting from AUAB, Qatar.	Standard Preventive Medicine measures, such as the reduction of harborages for these animals, as well as education on how to avoid them (shake out boots before donning, etc.), reduce the risk of exposure.	Short-term: **Low-high** based on disease incident reporting from AUAB, Qatar.
	Long-term: **No long-term health risk identified**		Long-term: **No long-term health risk identified**
Heat/Cold Stress			
Heat (see paragraph 8.1)	Short-term: Appropriately **Low to High** as per measured seasonal data. Risk of heat injury in summer months (appropriately to region of concern e.g. May-September) for unacclimatized personnel.	Adequate periods of acclimatization for newly reporting or returning personnel. Adjustment of work-rest cycles based on monitoring of climatic conditions.	Based on efficacy of control measure and incidence of heat/cold injury(ies) reported in various medical surveillance data bases e.g, TMDS, MERS, DRSi. Short-term: **Low to High**
	Long-term: Generally **Low**		Long-term: Generally **Low**
Cold (see paragraph 8.2)	Short-term: Appropriately **Low** as per measured seasonal data. The risk for cold stress/injuries is largely dependent on clothing/equipment worn, operational work intensity and individual factors rather than environmental factors alone.	Cold stress exposure is minimal at AUAB. Appropriate work/rest cycles during cold weather.	Short-term: **Low**
	Long-term: Generally **Low**		Long-term: Generally **Low**
Noise			
Noise (Continuous) (Flightline, Power Production) (see paragraph 9.1)	Short-term: **Low**, based on available data	Use of hearing protection. Labeling noise hazardous areas. Leadership enforcement of compliance with available PPE.	Based on efficacy of control measure typically practiced. Short-term: **Low**, based on available data
	Long-term: **Low to Moderate**		Long-Term: **Low to Moderate,** based on available data
Impulse (see paragraph 9.2)	Short-term: **Low**, based on available data		Short-term: **Low**, based on available data
	Long-term: **Low to Moderate**		Long-Term: **Low to Moderate,** based on available data
Unique Concerns			

Table 2: Population-Based Health Risk Estimates – AUAB, Qatar [1 – 5]			
Mold (see paragraph 10.1)			
Potential Environmental Contamination Sources (see paragraph 10.2)	Short and Long Term: **Low to High**, based on available data. Process hazards are identified and evaluated in DOEHRS for the corresponding work centers.		Short and Long Term: **Low to High**, based on available data. Process hazards are identified and evaluated in DOEHRS for the corresponding work centers.
Waste Sites/Waste Disposal	Short-term: **None identified**		Short-term: **None identified**
	Long-term: **No data available**		Long-term: **No data available**
Fuel/petroleum products/ industrial chemical spills	Short-term: **None identified**		Short-term: **None identified**
	Long-term: **No data available**		Long-term: **No data available**
Pesticides/Pest Control (see paragraph 10.3)	Short-term: **Low**, based on available data		Short-term: **Low**, based on available data
	Long-term: **Low**		Long-term: **Low**
Asbestos (see paragraph 10.5)	Short-term: **None identified**		Short-term: **None identified**
	Long-term: **No data available**		Long-term: **No data available**
Lead Based Paint (see paragraph 10.6)	Short-term: **Low**, based on available data		Short-term: **Low**, based on available data
	Long-term: **Low**		Long-term: **Low**
Burn Pits (see paragraph 10.7)	Short-term: **None identified**, no/insufficient data exist upon which to base a health risk assessment.	Control measures may have included locating burn pits downwind of prevailing winds, increased distance from living and working areas when possible, and improved waste segregation and management techniques	Short-term: **None identified**, no/insufficient data exist upon which to base a health risk assessment.
	Long-term: **None identified**		Long-term: **None identified**

Table 2: Population-Based Health Risk Estimates – AUAB, Qatar [1 – 5]

[1] This Summary Table provides a qualitative estimate of population-based short-and long-term health risks associated with the occupational and environment conditions at AUAB and other locations frequented by US military personnel in the immediate vicinity of AUAB, Qatar. It does not represent an individual exposure profile. Actual individual exposures and health effects depend on many variables. For example, while a chemical may be present in the environment, if a person does not inhale, ingest, or contact a specific dose of the chemical for adequate duration and frequency, then there may be no health risk. Alternatively, a person at a specific location may experience a unique exposure which could result in a significant individual exposure. Any such person seeking medical care should have their specific conditions of exposure documented on Form SF600.

[2] This assessment is based on specific environmental sampling data and reports obtained from May 2004 through July 2015. Sampling locations are assumed to be representative of exposure points for the camp population, but may not reflect all the fluctuations in environmental quality or capture unique exposure incidents.

[3] This Summary Table is organized by major categories of identified sources of health risk. It only lists those sub-categories specifically identified and addressed at AUAB. The health risks are presented as Low, Moderate, High or Extremely High for both acute and chronic health effects. The risk level is based on an assessment of both the potential severity of the health effects that could be caused and probability that exposure would occur at a level to produce such health effects. Details can be obtained from the United States Army Public Health Command (USAPHC). More detailed descriptions of OEH exposures that were evaluated are discussed in the following sections of this report.

[4] Risks in this Summary Table are based on quantitative surveillance thresholds (e.g. review of disease surveillance data) or screening levels (e.g. Military Exposure Guidelines (MEGs) for chemicals). Some previous assessment reports may provide slightly inconsistent 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 few samples.

[5] All OEH risk estimates represent residual risk after accounting for preventive controls in place. Occupational exposures and exposures to endemic diseases are greatly reduced by preventive measures in place. For environmental exposures related to airborne dust, there are limited preventive measures available and available measures have little efficacy in reducing exposure to ambient conditions.

SITE DESCRIPTION:

Al Udeid AB (AUAB) is located approximately 30 km southwest of Doha, the capital of Qatar, and 25 km northwest of Messaieed (also referred to as Um Sa'id in some documents). The base is divided into 6 distinct main areas: Coalition Compound (CC), Blatchford-Preston Complex (BPC), Ops Town, Log Town, Northeast Ramp and Munitions (or Ammo). CC and BPC are co-located on the east side of the base in a secured area. Transient personnel flow through the CC area, while the majority of the base has resting quarters in either the CC or BPC compound. The Medical Group and CENTCOM Forward HQ are located in the BPC. Ops Town and Log Town both provide base support functions, while the Northeast Ramp consists of AFCENT Forward Special Operations Command, Special Operations Command Central, and the Combined Air Operations Center, as well as wing HQ. Munitions are on the far west side of the base. Al Udeid is home to the 379th Air Expeditionary Wing and the 901st Royal Air Force, as well as several other joint force tenant units.

Local Climate:

Qatar's climate is subtropical dry, hot desert climate with low annual rainfall, very high temperatures in summer and a big difference between maximum and minimum temperatures. The scarce annual precipitation, usually averaging less than 130 mm (5 in) and falls during winter in short, torrential downpours.

1 Discussion of Health Risks **Health Risks at AUAB by Source**

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

The following contains examples of information that may be provided about health risk assessments (short or long term). Each section – **air, water, soil, etc.** is divided into five parts:

- **Sample data/Example texts –** Overall total samples collected, periods of sampling, range of concentration and overall average, and/or (if any) for each satellite sites around the hub site.

- **Approach** – including a brief description about how the data were treated/evaluated, including the relevance of peak and average values to acute or chronic Military Exposure Guides (MEGs).

- **Risk Summary** – a brief summary of the overall short/long-term risk with an explanation of specific periods during which the risk is higher or lower than the overall risk for the site.

- **Medical Implications** – a brief description of clinical outcomes may have been seen while in theater resulting from short-term exposures or those that may be seen in the future related to chronic, low dose exposures and

- **Confidence in the Risk Assessment** – based on the number of samples, frequency and consistency of sampling events and consistency of the results within the dataset.

2 Air

2.1 Area-Specific Sources Identified

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

2.2 Particulate Matter

Particulate matter (PM) is a complex mixture of extremely small particles suspended in the air. PM includes solid particles and liquid droplets emitted directly into the air by sources such as: power plants, motor vehicles, aircraft, tactical generators, construction activities, fires, and natural windblown dust. PM can include sand, soil, metals, volatile organic compounds, allergens, and other compounds such as nitrates or sulfates that are formed by condensation or transformation of combustion exhaust. PM composition and particle size vary considerably depending on the source. Generally particulate matter of health concern is divided into two fractions: PM_{10}, which includes coarse particles with a diameter of 10 micrometers or less (0.0004 inches or one-seventh the width of a human hair), and fine particles less than 2.5 micron ($PM_{2.5}$), which can reach the deepest regions of the lungs when inhaled. Exposure to excessive PM is linked to a variety of potential health effects.

2.3 Particulate Matter, less than 10 microns (PM_{10})

2.3.1 Exposure Guidelines:

Short-term (24-hour) PM_{10} (mg/m^3):
Negligible MEG = 0.250
Marginal MEG = 0.420
Critical MEG = 0.600

Long-term PM_{10} MEG (mg/m^3):
Not defined.

2.3.2 Sample data/Example Texts:

A total of 67 valid PM_{10} air samples were collected from 2004 to 2008. The range of 24-hour PM_{10} concentrations was $32\mu g/m^3$–$1803\mu g/m^3$ with an average concentration of $916\mu g/m^3$.

2.3.3 Short-term (acute) health risk for PM_{10}:

Approach:

To assess acute risk associated with PM_{10}, the peak concentrations of PM_{10} were used to arrive at the acute risk for the period from 2004 to 2008. All contaminants were measured at concentrations below MEGs. Two contaminants have detection limits greater than the MEG (Cadmium and Vanadium). Since these contaminants weren't detected in any of the samples and/or there is no expected source of these contaminants, no further assessment was needed (based on guidance in TG 230 paragraph 3.4.4.4).

Risk Summary: Low

While, the average of 916μg/m^3 and peak 1803μg/m^3 PM_{10} sample concentrations would indicate that the Risk is HIGH, the sample results show inconsistencies leading to a judgement of LOW. Overall 58/67 (94%) sampling days had concentrations below the 24-hour negligible MEG (LOW Risk); 6/67 (10%) of the sampling days were between the 24-hour negligible MEG and the 24-hour marginal MEG (LOW Risk); 0/67 (0%) of the sampling days were between the 24-hour marginal and the 24-hour critical MEG (MODERATE Risk); 3/67 (5%) of the sampling days were greater than the critical MEG (HIGH risk). Confidence is low based on limitations in sampling data.

Medical Implications:

Respiratory effects can increasingly impact real-time health and mission capabilities as they exceed higher levels of MEGs. Acute effects to relatively healthy troops are mostly eye, nose, and throat irritation, and respirator effects (sneezing, adaptive responses such as coughing, sinus congestion and drainage) that can be exacerbated by increased activity.

Confidence in the Risk Assessment:

Confidence is **low** based on limitations in sampling data as described above.

2.3.4 Long-term (chronic) health risk for PM_{10}:

Health guidelines are not defined for PM_{10}. The United States Environmental Protection Agency has retracted its long-term standard (NAAQS) for PM_{10} due to an inability to clearly link chronic health effects with PM_{10} exposures.

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

2.4.1 Exposure Guidelines:

Short-term (24-hour) $PM_{2.5}$ (mg/m^3):
Negligible MEG = 0.065
Marginal MEG = 0.250
Critical MEG = 0.500

Long-term (1 year) $PM_{2.5}$ MEG (mg/m^3):
Negligible MEG = 0.015
Marginal MEG = 0.065

2.4.2 Sample data:

From February 2006 to February 2007, 45 ambient air $PM_{2.5}$ samples were collected at AUAB. The range of 24-hour $PM_{2.5}$ concentrations in those 45 samples was 24-350 μg/m^3, with an average concentration of 63 μg/m^3.

2.4.3 Short-term (acute) health risk for $PM_{2.5}$:

Approach:

To assess acute risk associated with $PM_{2.5}$, the peak concentrations of PM_{10} were used to arrive at the acute risk for the period from February 2006 to February 2007. The peak concentrations ranged 24 μg/m^3 to 350 μg/m^3. A risk estimate for the highest peak concentration was calculated. If the highest peak posed a moderated or higher health risk, risk estimates for the next highest concentrations were repeated until the calculated risk dropped to low. Peaks with an estimated risk of moderate or higher are reported as periods of elevated risk.

Risk Summary: Moderate

Fine particulate matter, less than 2.5 micrometers in diameter ($PM_{2.5}$) are present in the air in Qatar at low concentrations. Based on average 63 $\mu g/m^3$ and peak 350 $\mu g/m^3$ of $PM_{2.5}$ air sample concentrations, as compared with the short-term marginal MEG 0.250 mg/m^3. The short-term health risk assessment for $PM_{2.5}$ sample concentrations and the likelihood of exposure at these health risk hazard is Moderate.

Medical Implications:

At the **moderate** risk level, a small percentage of individuals may have been at increased risk of developing chronic health conditions. These conditions include reduced lung function, chronic bronchitis, chronic obstructive pulmonary disease, asthma and certain cardiopulmonary diseases. Those with a history of asthma or pre-existing cardiopulmonary disease have a higher risk for exacerbating these chronic conditions. However, as the majority of the population at AUAB and the adjacent camps did not work outdoors for more than eight to twelve hours/day the risk for these chronic conditions is likely overstated.

Confidence in the risk assessment: Confidence in the risk assessment is **medium** based on the limited $PM_{2.5}$ air sampling data available and inconsistency of sampling.

2.4.4 Long-term (chronic) health risk for $PM_{2.5}$:

Approach: For chronic health risk, it was assumed that the longest deployment lasted twelve to fifteen months. To assess chronic risk associated with $PM_{2.5}$, the overall yearly average concentration of $PM_{2.5}$ was used to arrive at a long term health risk for 2006 through 2007. The average $PM_{2.5}$ concentration during this period was 63 $\mu g/m^3$, with a range from 24 $\mu g/m^3$ to 350 $\mu g/m^3$. If sufficient data were available, the risk assessment was then repeated using the annual average concentrations for each year $PM_{2.5}$ data exist.

Risk Summary: Low
Based on average 63 $\mu g/m^3$ and peak 350 $\mu g/m^3$ $PM_{2.5}$ sample concentrations, as compared with the long-term 1year negligible MEG (0.015mg/m^3). The long-term health risk assessment for $PM_{2.5}$ sample concentrations and the likelihood of exposure at these health risk hazard is low.

Medical implications: At the low to moderate risk level, a small percentage of individuals may have been at increased risk of developing chronic health conditions. These conditions include reduced lung function, chronic bronchitis, chronic obstructive pulmonary disease, asthma and certain cardiopulmonary diseases. Those with a history of asthma or pre-existing cardiopulmonary disease have a higher risk for exacerbating these chronic conditions. However, as the majority of the population at AUAB did not work outdoors for more than eight to twelve hours/day the risk for these chronic conditions is likely overstated.

Confidence in the risk assessment: The long-term $PM_{2.5}$ health risk assessment for AUAB was **low** based on $PM_{2.5}$ concentrations and the likelihood of exposure at these hazard severity levels. A moderate health risk assessment suggests that long-term exposure to peak $PM_{2.5}$ concentrations at AUAB were expected to have degraded mission capabilities in terms of the required mission standard and would result in reduced mission capability if hazards occurred during the mission. Confidence in the short-term $PM_{2.5}$ health risk assessment was **high** (TG 230, Table 3-6).

2.5 Airborne Metals

2.5.1 Sample data:

From 2004 through 2008, metals analysis was performed on ambient air particulate matter samples (including PM_{10} and $PM_{2.5}$) collected at AUAB. No metals were detected above their corresponding military exposure guidelines published in the USAPHC TG 230.

The health risk assessment was based on average and peak concentration of 68 PM_{10} airborne metal samples collected at AUAB from 2004-2008, and the likelihood of exposure. Risks are determined based on comparison to available MEGs.

Approach:

For screening purposes, both peak and average concentrations of all airborne metals detected were compared to their corresponding 1-year negligible MEG. Risk estimates based on the USAPHC TG 230 methodology are calculated for any compound detected at a concentration greater than its 1-year MEG in 5% or more of the samples collected.

Risk Summary: Low
No metal analytes had an average or peak sample concentration that exceeded the short-term 14 day negligible MEG (not anticipated to result in acute performance degrading effects or specific long-term health consequences [based on guidance in TG 230, Table 2-2]). All contaminants were measured at concentrations below MEGs. Two contaminants have detection limits greater than the MEG (Cadmium, and Vanadium). Since these contaminants weren't detected in any of the samples and/or there is no expected source of these contaminants, no further assessment was needed (based on guidance in TG 230 paragraph 3.4.4.4). The short-term health risk assessment for airborne metal analyte sample concentrations is Low.

2.5.2 Short-term (acute) health risk:

Low short-term health risk was identified based on available sampling data.

2.5.3 Long-term (chronic) health risk:

Low long-term health risk was identified based on available sampling data.

Confidence in the risk assessment:

Confidence in this risk assessment is **low** based on available sampling data within this region and similar sampling results throughout AUAB.

2.6 Volatile Organic Compounds (VOC)

2.6.1 Sample data:

From March 2005 and June to July 2006, 17 valid volatile organic chemical (VOC) air samples were collected at AUAB. VOCs were detected in some of the samples, but at levels below pertinent MEGs. Risks are determined based on comparison to available MEGs.

Approach:

Typically, most VOC sampling is either associated with a specific source or incident driven. Data of this type, especially when there is sparse sampling data exist, is generally not representative of exposure to an entire camp population.

For screening purposes, peak and average concentrations of all airborne VOCs detected were compared to their corresponding 1-year negligible MEG. Short-term risk estimates based on the USAPHC TG 230 methodology are determined for any compound detected at a concentration greater than its 1-year MEG and long-term risk estimates were determined where VOC were detected above their respective 1-year MEG in 5% or more of the samples collected.

Risk Summary:

Insufficient data exist upon which to base a health risk assessment.

2.6.2 Short-term (acute) health risk of VOCs:

For personnel with potential for exposure based on the levels detected**, no short-term health risk was identified**.

Medical Implications:

All of sampled concentrations generally will not be representative of possible exposures to the entire camp population. Rather they only represent the population residing or working in proximity to the sample location. The overwhelming majority of others will have far less potential for exposure at the measured levels.

Confidence in the risk assessment:

Confidence in this risk assessment is **Low** based on the few samples taken and the laboratory's limited capability to quantify some VOC compounds.

2.6.3 Long-term (chronic) health risk of VOCs:

Approach:

No parameters exceeded 1-year Negligible MEGs. For screening purposes, peak and average concentrations of all airborne VOCs detected were compared to their corresponding 1-year negligible MEG. Short-term risk estimates based on the USAPHC TG 230 methodology are determined for any compound detected at a concentration greater than its 1-year MEG and long-term risk estimates were determined where VOC were detected above their respective 1-year MEG in 5% or more of the samples collected.

Risk Summary: Negligible

Medical Implications: None

Confidence in risk estimate:

Confidence in the risk assessment is **Low** based on 17 samples collected at AUAB.

3 Soil

3.1 Site-Specific Sources Identified

3.1.2 Sample data:

From 2004 through 2008, a total of 15 surface soil samples were collected at AUAB. Laboratory analysis of all soil samples included semi-volatile organic compounds (SVOCs), heavy metals, polychlorinated biphenyls (PCB), pesticides, herbicides and radionuclides. The primary exposure pathways associated with soil are dermal contact and incidental ingestion. Individuals involved in construction, maintenance and post fire clean-up activities were at greatest potential for exposure to soil. These individuals comprise a relatively small proportion of the overall camp population.

According to field data sheets, all samples were collected from areas and/or activities where there was high potential for soil exposure such as in maintenance areas, physical training (PT) areas, during excavation, while filling sand bags and/or during construction activities. Laboratory analysis of soil samples included volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polycyclic aromatic hydrocarbons (PAHs), heavy metals, polychlorinated biphenyls (PCB), pesticides, fungicides, herbicides, insecticides, and radionuclides. The primary exposure pathways associated with soil are dermal contact and incidental ingestion.

Individuals involved in construction, maintenance and/or post (in case of any fire incident at the site) fire clean-up activities were at greatest potential for exposure to soil. These individuals comprise a relatively small proportion of the overall camp population.

Approach:

Currently, sampling data for soil are not evaluated for short term (acute) health risks**.**

For long-term health risk, sample results were compared with each of the corresponding long-term MEGs published in the USAPHC TG 230 screening purposes. Compounds detected without a single exceedance of the 1-year MEG were excluded from further consideration. Long-term risk estimates were based on the probability of exposure to the concentrations detected.

3.1.3 Short-term (acute) health risk for soil:

Risk Summary: Low, based on available data.

Medical Implications: None known

Confidence in the Risk Assessment: Not applicable, soil is not evaluated for short-term health risks.

3.1.4 Long-term (chronic) health risk for soil:

Long-term: **Low**, based on available data

Risk Summary: Not evaluated – no/insufficient data exist upon which to base a risk assessment.

Medical Implications: None known.

Confidence in risk estimate: Confidence in the risk assessment is low based on 15samples collected across regional soils.

Despite the bulk of the samples being collected in areas with great potential for residual contamination from waste disposal and a large structural fire none of the soil constituents approached the MEG. Confidence in the risk assessment is high.

4 Water

4.1 Site-Specific Sources Identified

Drinking water supplies at AUAB are from locally procured bottled water sources approved by the US Army Public Health Command. At AUAB, Bioenvironmental Engineering conducts routine field testing per Air Force Instruction (AFI) 48-138/US Army Technical Bulletin, Medical 577 (TB MED 577), Sanitary Control and Surveillance of Field Water Supplies, May 2010.

The non-potable water distribution system consists of a feed line from Ras Abu Fontas desalination plant, underground storage tanks, aboveground storage tanks, chlorine injection, and a piped distribution system in the Coalition Compound, Blatchford-Preston Complex, Log Town, Northeast Ramp area, and Ammo (not chlorinated). The same water is used to supply Qatari operations on base. Tanks in Ops Town carrying non-potable water are filled by water trucks. The water trucks are filled with water from a fill station in Log Town, fed by the water from the distribution system. Water used in DFACS and other eateries is safe for use due to in-place filters, cooking processes and use of bleach on raw foods.

Based on the information provided from the field, all samples for untreated water samples were associated with source water for treatment and no exposure pathways were associated with those samples. Therefore, untreated samples are not assessed as potential health hazards.

4.2 Consumed Water (Water for drinking or cooking consumption)

4.2.1 Sample data/notes:

Over 2000 bacteriological samples (~20 samples a month) were collected and analyzed for bottled water since 2009. All results were negative for bacteriological contamination.

4.2.2 Short-term (acute) health risk for drinking bottled water:

Approach: In order to determine acute health risk associated with consumption of bottled water the following assumptions were made:

- Base residents ingest 15 liters of bottled water per day or less.
- All U.S. personnel at this location were expected to remain at this site for approximately 1 year.

Based on these assumptions, the maximum detected concentration for each analyte was compared to its respective 14-day, Negligible MEG for consumption of up to 15 liters of water per day (15L/day) and/or the short-term Field water standards published in TB MED 577, Sanitary Control and Surveillance of Field Water Supplies.

Risk Summary: Based on the above approach, the short-term risk associated with consumption of bottled water at AUAB is **low**.

Medical Implications: No medical implications are expected from consuming water at the concentration detected at AUAB.

Confidence in the risk assessment: Based on the samples that are collected and analyzed, resulting in negative bacteriological contamination, confidence in this risk assessment is **high**.

4.2.3 Long-term (chronic) health risk:

Approach: Bottled water is supplied to AUAB in distinct lots and from multiple vendors. Thus it is inappropriate to average analytical results across the spectrum of water samples/suppliers. As a result, the maximum detected concentration for each analyte was used to perform the long-term health risk screening. This process could result in overestimation of the long-term health risk as it assumes that camp residents consume water at the maximum detected concentration consistently during their deployment.

Risk Summary: Based on the above approach, the long-term risk associated with consumption of bottled water at AUAB is **low**.

Medical Implications: None identified, based on available sample data.

Confidence in the risk assessment: Based on the samples that are collected and analyzed, resulting in negative bacteriological contamination, confidence in this risk assessment is **high**.

4.3 Water for Non-Drinking/Other purposes (RO and other sources of treated water)

4.3.1 Sample data/notes:

From 2008 through 2014, 43 RO treated and disinfected fresh water samples were collected at AUAB. Water samples were analyzed for inorganic compounds, VOC, SVOC and various physical characteristics. Preventive medicine surveillance for microbiological contaminants (coliforms/*E.coli*) is standard operating procedure, but data associated with bacteriological analyses was not available.

Potable water used for purposes other than drinking is produced by State of Qatar Ministry of Electricity and Water using Multistage Flash Distillation of source water taken from the Persian Gulf. Treated Water is distributed to the dining facilities and other eateries for cooking and hand washing. Additionally, treated water is used for showers, toilets, personal hygiene, aircraft washing, etc. Routine Field testing is performed by Bioenvironmental Engineering and includes bacteriological, chemical, radiological, FAC, and other parameters per AFI 48-138 and TB MED 577.

4.3.2 Short-term (acute) and long-term (chronic) health risks associated with water uses other than drinking:

Approach: In order to assess the health risk associated with water uses other than drinking, the following assumptions were made:

- Treated water was used for cooking and other personal hygiene purposes.
- Deployments length is service specific (Army personnel 9 months, AF personnel 6 months and Navy personnel from 12 to15 months).

- The primary routes of exposure associated with RO treated water were incidental ingestion through cooking and personal hygiene (i.e., brushing teeth/oral hygiene) and dermal contact when showering.
- Camp residents ingest far less than 5 liters (food preparation) of RO treated water per day.
- Disinfected fresh water was used only for showering and hand washing.

Based on guidance provided in USAPHC Technical Guide 230, *Environmental Health Risk Assessment and Chemical Exposure Guidelines for Deployed Military Personnel* (USAPHC TG 230), any compound with a peak concentration less than or equal to 2.5 times the 14-day negligible MEG for consuming 5 liters of water per day/ (5-L/day) may be eliminated from further consideration. If a 14 day, 5-L/day negligible MEG was not available, the more conservative 1-year, 5-L/day negligible was used for screening purposes.

4.3.2.1 **RO Treated Water (used for cooking and personal hygiene)**

4.3.2.2 Sample data/notes

Risk Summary: No acute or chronic health risks associated with incidental ingestion of RO treated water were identified at AUAB.

Medical Implications: None.

Confidence in the Risk Assessment: Confidence in the risk assessment is high. Records indicate that the routinely monitored parameters (pH, chlorine, bacteriological) are typically within acceptable limits. Deviations from acceptable limits (chlorine) are investigated and corrected as they occur. Records of these measurements are available in DOEHRS.

4.3.2.2 **Disinfected Fresh Water (used for person hygiene)**

Risk Summary: Based on the above approach and sample data/notes provided, any risks would be considered **low**.

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

Confidence in the Risk Assessment: Even though there are relatively few samples in the data set, confidence in this risk assessment is high based on the limited potential for ingestion of host nation treated water.

5 Military Unique

5.1 Chemical Biological, Radiological Nuclear (CBRN) Weapons

No specific hazard sources were documented in Defense Occupational and Environmental Health Readiness System (DOEHRS), or the Military Exposure Surveillance Library (MESL) data portal during the May 2004 to July 2015 time frame.

5.1.1 Short and long-term health risks:

Not Evaluated – No data were available upon which to base a risk assessment specific to AUAB.

Risk Summary: None, no data were available upon which to base a risk assessment specific to AUAB.

Medical Implications: None, no data were available upon which to base a risk assessment specific to AUAB.

Confidence in the Risk Assessment: None, no data were available upon which to base a risk assessment specific to AUAB.

5.2 Depleted Uranium (DU)

DU is a component of some aircraft and munitions that are currently on AUAB. However, no abandoned/damaged DU is known to exist.

All radioactive materials are accounted for, and are properly stored and maintained.

5.2.1 Short and long-term health risks:

Not Evaluated -

Risk Summary: None, insufficient data exists upon which to base a risk assessment specific to AUAB.

Medical Implications: None, insufficient data exists upon which to base a risk assessment specific to AUAB.

Confidence in the Risk Assessment: None, insufficient data exists upon which to base a risk assessment specific to AUAB.

5.3 Ionizing Radiation

Medical and dental radiography is utilized in the Medical Clinic. Radiology personnel are enrolled in the thermoluminescent dosimetry (TLD) program, and exposures have been ALARA (negligible) since 2012. Industrial radiography is not accomplished at AUAB. All ionizing radiation exposures for occupational radiation workers are below the occupational exposure limits. The base also has equipment containing sealed radioactive material, including chemical agent monitors and alarms, moisture density gauges and targeting pods. In March of 2014, two of the largest items (Troxlers) were sent back to the manufacturer because the shop no longer used them. Security Forces personnel used an x-ray backscatter device for vehicles entering the gate. Administrative procedures are in place to protect service members. AF workplace-specific evaluations are available in the MESL and/or DOEHRS. All radioactive materials are accounted for, and are properly stored and maintained.

5.3.1 Short and long-term health risks:

Risk Summary: Low, due to procedures in place to maintain as low as reasonably achievable.

Medical Implications: None.

Confidence in the Risk Assessment: Confidence in this risk is **high**.

5.4 Non-Ionizing Radiation

Lasers –

Aircraft are equipped with various lasers. Specific health hazards associated with each laser are documented in DOEHRS. Administrative procedures are in place to reduce incidents. The biggest risk is lasing of aircrews while flying. In some cases, crews were able don Aircrew Laser Eye Protection within time and perform adequate procedures to avoid exposure.

Electro-Magnetic Frequency (EMF) Radiation –

Aircraft and ground-based emitters have administrative procedures in place to reduce the potential for exposures and ensure personnel are not within the uncontrolled environment hazard distance. Ground-based emitters have been evaluated and have administrative controls in place that ensure personnel are not within the uncontrolled environment hazard distance.

5.4.1 Short and long-term health risks:

Risk Summary: Low, due to procedures in place to maintain as low as reasonably achievable

Medical Implications:

Lasers – Laser exposure evaluations completed by the Flight Doctors are forwarded to the USAF School of Aerospace Medicine Help Desk for archiving and placed in the member's medical record.

EMF – Operators of these systems are aware to notify Bioenvironmental Engineering of any potential exposure to EMF radiation to ensure proper investigation and documentation.

Confidence in the Risk Assessment: Procedures are in place to maintain exposures below the permissible exposure limits. Confidence in this risk assessment is **medium**.

6 Endemic Diseases

6.1 Sample data/notes:

The assessed risk for endemic diseases addressed below represents the residual risk that exists in the presence of preventive measures.

Department of Defense Directive 6490.02 series, Comprehensive Health Surveillance, establishes policy for routine health surveillance of all DoD personnel throughout their military service.

The Armed Forces Health Surveillance Branch (AFHSB) maintains archives of medical event reports for all Services.

Medical event reports identified related to deployment in AUAB did not identify specific locations within the country, nor did they describe the probable site of the exposure; therefore, epidemiological analysis of medical event data was limited to the country level.

Endemic diseases present in Qatar were assessed by referring to the World Health Organization's Qatar Communicable Disease Profile and the "Destinations" section of the Centers for Disease Control and

Prevention (CDC) Travelers' Health website,
http://wwwnc.cdc.gov/travel/destinations/traveler/none/Qatar

Where effective vaccines, such as those for Hepatitis A and B, are in place, risk to individuals is effectively reduced to none and these endemic diseases were excluded from further assessment.

Reporting of medical events from deployed environments is inconsistent. Identified reports of endemic disease associated with deployment to AUAB, Qatar are assumed not to represent all cases of reportable endemic disease events among service personnel deployed to AUAB. Where available, additional relevant reports were used to supplement reportable medical event data for this assessment.

6.2 Gastrointestinal Diseases

U.S. Service members have little or no immunity to the food and waterborne diseases present in AUAB, Qatar. To prevent food and waterborne diseases among individuals deployed to AUAB, food and water are purchased from approved sources. Food is prepared in facilities where there is public health oversight (certificate of sanitation, health screening of food service workers, periodic inspections, etc.). Due to the potential presence of disease causing organisms, as well as the high prevalence of improper food handling and preparation, local food and water were not approved for consumption. Viral gastroenteritis that is spread through contact or fomites (any inanimate object or substance capable of carrying infectious organisms) presents a recurrent risk due to a high rate of personnel turnover, and shared dining, berthing, bathroom facilities, and working spaces.

Approach: The health risk for fomite-borne gastrointestinal infections and endemic food and waterborne diseases to individuals deployed to AUAB, Qatar during the period of this assessment was epidemiologically assessed based on the combination of identified endemic diseases, knowledge of preventive measures in place, review of medical event reports associated with deployment to AUAB, and review of military public health reports.

6.2.1 Short-term health risks:

Risk Assessment:
The short-term risk for viral gastroenteritis was **moderate.** Risk due to a high rate of personnel turnover, shared dining, berthing and bathroom facilities, and working spaces is not substantially different than that expected in similar settings within the United States.

The short-term risk associated with food borne and waterborne diseases in AUAB was **low** (bacterial or viral gastroenteritis, protozoal diarrhea, cholera, brucellosis, hepatitis E).

Medical Implications: Gastroenteritis, particularly from viral agents, can cause periodic outbreaks in spite of preventive measures. A small number of infections may require greater than 72 hours convalescence and/or hospitalization.

Confidence in the risk assessment: Confidence in the risk assessment is **high**. Food and water borne diseases, especially those with short convalescence and lack of long-term health effects are often underreported for deployed military populations.

6.2.2 Long-term health risks:

Risk Assessment: The long-term risk associated with food and waterborne diseases was **low** for protozoal diarrhea and brucellosis.

Medical Implications: Long-term health effects resulting from infection with food and waterborne diseases are rare.

Confidence in the risk assessment: Confidence in the risk assessment was **high**. Incidence of protozoal diarrhea and brucellosis in the post deployment military population is known to be extremely low.

6.3 Arthropod Vector-Borne Diseases

The climate and ecological habitat found in Qatar support populations of arthropod vectors, including mosquitoes, ticks, and sand flies. Risk for arthropod-borne disease is higher during warmer months (typically from April through November); with variable rates of disease transmission (vector-borne diseases occur at low or unknown levels throughout the country). Personnel may have been exposed to mosquitoes, ticks, sand flies, or other biting vectors both during the day or night. Risk is higher in urban and other densely populated areas, or near where animals were kept. Removing vector harborages, spraying for vectors within base camps, avoiding animals or areas where they were kept, proper wearing of insecticide-treated (permethrin) uniforms, use of bed nets in field conditions, and the application of insect repellent to the skin (DEET) were the main protective measures against vector-borne diseases. Of the endemic vector-borne diseases present in Qatar, malaria is the only disease for which chemoprophylaxis is available.

Approach: The health risk for endemic vector-borne diseases to individuals deployed to AUAB during the period of this assessment was epidemiologically assessed based on the combination of identified endemic diseases, knowledge of preventive measures in place, review of medical event reports associated with deployment to AUAB and review of military public health reports.

6.3.1 Short-term (acute) health risks:

Risk assessment: The short-term risk for the vector-borne diseases sandfly fever, West Nile Fever, Crimean-Congo hemorrhagic fever, typhus, and plague was **low.** Individuals who deploy from AUAB, and/or supported base camps, to urban or rural outlying areas may experience increased short-term risk.

The short-term risk for malaria and cutaneous leishmaniasis was **moderate**. Individuals who deployed from AUAB or the other camps in the immediate vicinity, to urban or rural outlying areas, may have experienced increased short-term risk.

Medical Implications: Malaria, sandfly fever, West Nile Fever, Crimean-Congo hemorrhagic fever, typhus, and plague present in AUAB, Qatar have fairly short incubation periods ranging from days to weeks. Any of these diseases would initially present as acute fever and malaise, some accompanied by rash, and would lead to acute, sometimes severe illness. Cutaneous leishmaniasis typically presents as skin lesions, single or multiple, that start as a papule and enlarge into an ulcer.

Confidence in the risk assessment: Confidence in the risk assessment is **moderate**. Reports of vector borne disease, including malaria and leishmaniasis, were received through official DoD medical event reporting systems.

6.3.2 Long-term (acute) health risks:

Risk assessment: The long-term risk for leishmaniasis, cutaneous and visceral, was **low**.
The long-term risk for *vivax* (relapsing) malaria was **low**.

Medical Implications: Both visceral and cutaneous leishmaniasis may have extended incubation periods, ranging from a months to years. Although rare, it is possible to be infected during deployment, but not to have clinically evident disease until redeployed. Leishmaniasis should be considered in the differential diagnosis for any unusual skin lesions, or chronic, systemic disease. Plasmodium v*ivax* and P. *falciparum* malaria were the predominate species of malaria found in Qatar. Relapses following *vivax* blood stage treatment are possible due to hypnozoites that remain dormant in the liver.

Confidence in the risk assessment: Confidence in risk assessment is **medium**. Incidence of visceral leishmaniasis in the post deployment military population is known to be low. Cases of cutaneous leishmaniasis were detected and treated post deployment. The military medical community was/is aware of the presence of leishmaniasis in Qatar, and skin lesions in individuals with a history of time spent in Qatar were/are evaluated with that in mind. No cases of relapsing malaria have been reported in the Service-mandated reporting systems.

6.4 Water Contact Diseases

Operations or activities that involved extensive water contact may have resulted in personnel being temporarily debilitated with leptospirosis in some locations. Leptospirosis health risk typically increases during flooding. In addition, although not specifically assessed in this document, bodies of surface water were likely to be contaminated with human and animal waste. Activities such as wading or swimming may have resulted in exposures to enteric diseases such as diarrhea and hepatitis via incidental ingestion of water. Prolonged water contact also may have also lead to the development of a variety of potentially debilitating skin conditions such as bacterial or fungal dermatitis.

Approach: The health risk for endemic water contact diseases to individuals deployed to AUAB during the period of this assessment was epidemiologically assessed based on the combination of identified endemic diseases, knowledge of preventive measures in place, review of medical event reports associated with deployment to AUAB, and review of military public health reports.

6.4.1 Short-term (acute) health risks:

Risk assessment: Due to the background of any existing water-contact diseases, the risk for any disease is **moderate**.

Medical Implications: Human infection occurs through exposure to water or soil contaminated by infected animals and has been associated with wading, and swimming in contaminated, untreated open water. Leptospirosis can enter the body through cut or abraded skin, mucous membranes, and conjunctivae. Ingestion of contaminated water can also lead to infection.

Confidence in the risk assessment: Confidence is **medium**.

6.4.2 Long-term (acute) health risks:

Leptospirosis risk is moderate year-round with peak season April through October. The disease is present in Qatar, but at unknown levels. Data are insufficient to assess potential disease rates, up to 1-10 percent of personnel wading or swimming in bodies of water such as lakes, streams, or irrigated fields could be affected per month. The acute generalized illness associated with infection can mimic other tropical

diseases (for example, dengue fever, malaria, and typhus), and common symptoms include fever, chills, myalgia, nausea, diarrhea, cough, and conjunctival suffusion. Manifestations of severe disease can include jaundice, renal failure, hemorrhage, pneumonitis, and hemodynamic collapse. Recreational activities involving extensive water contact may result in personnel being temporarily debilitated with leptospirosis. Health risk for leptospirosis is **moderate**.

6.5 Respiratory Diseases

U.S. military populations living and working in close-quarter conditions were at risk for substantial person-to-person spread of respiratory virus infections such as the common cold and influenza. Primary exposure pathways for tuberculosis include prolonged close contact (generally several hours per day for greater than three days per week in a closed space) with the local population or third country national contractors. U.S. personnel who remained on base had limited to no contact with the local population, and local and third country national workers/contractors were required to complete health screening prior to employment.

Approach: The health risk for respiratory diseases to individuals deployed to AUAB during the period of this assessment was epidemiologically assessed based on the combination of identified endemic diseases, knowledge of preventive measures in place, review of medical event reports associated with deployment to AUAB, and review of military public health reports.

6.5.1 Short-term (acute) health risks:
Risk Assessment: The short-term risk for upper respiratory infections was low. Risk due to a high rate of personnel turnover, shared dining, berthing, recreational facilities, and working spaces is not substantially different than that expected in similar settings within the United States.

The short-term risk for tuberculosis was **low**.

Medical Implications:

Upper respiratory infections, particularly from viral agents, can cause periodic outbreaks in spite of preventive measures. A small proportion of infections may require greater than 72 hours convalescence and/or hospitalization.

Symptoms of tuberculosis, including fever, weight loss, night sweats and cough, typically start within 1-6 months of infection. The lifetime risk for tuberculosis after becoming infected is 5-10%; half of this risk occurs in the first two years following infection.

Confidence in the risk assessment: Confidence in risk assessment is medium. Upper respiratory infections, especially those with short convalescence and lack of long-term health effects are not reportable for deployed military populations. Tuberculosis prevalence in the local population is widespread, but no reports of tuberculosis were identified for individuals deployed to AUAB during the assessment period.

6.5.2 Long-term (chronic) health risks:

Risk Assessment: The long-term risk for tuberculosis was **low**.

Medical Implications: Symptoms of tuberculosis can be delayed by two or more years following infection. Tuberculosis should be considered in assessing symptoms of fever accompanied by night sweats and cough.

Confidence in the risk assessment: Confidence in risk assessment is **high**. Prevalence of tuberculosis in the local population is widespread, but prevalence of tuberculosis in the post deployment military population is known to be extremely low.

6.6 Animal-Contact Diseases

Animals in Qatar were not routinely vaccinated against vaccine preventable diseases such as rabies or anthrax. Q-fever, anthrax, and rabies are known to be present in Qatar. Exposure to animals, and/or locations where animals were kept (stray dogs/cats, barnyards, slaughterhouses), were the primary infection sources for all these diseases, and avoidance of companion and farm animal contacts was the primary prevention strategy. Preventive measures in place include anthrax vaccination, which is effective in preventing both cutaneous and inhalation anthrax, and rabies post exposure prophylaxis, which is effective for preventing onset of rabies in exposed individuals.

Approach: The health risk for endemic animal contact diseases to individuals deployed to AUAB during the period of this assessment was epidemiologically assessed based on the combination of identified endemic diseases, knowledge of preventive measures in place, review of medical event reports associated with deployment to AUAB, and review of military public health reports.

6.6.1 Short-term (acute) health risks:

Risk Assessment: The short-term risk for anthrax (naturally acquired), rabies and Q-fever was **moderate**.

Medical Implications: Naturally occurring anthrax (non-weaponized) is an acute disease that usually affects the skin, while inhalation anthrax has mild and non-specific initial symptoms among unimmunized individuals.

Symptoms of acute Q-fever, which may present one week to greater than one month after exposure, include fever, chills and weakness.

Rabies presents as an acute, viral encephalomyelitis and is almost invariably fatal.

Confidence in the risk assessment: Confidence in risk assessment is **high**.

6.6.2 Long-term (chronic) health risks:

Risk Assessment: The long-term risk for Q-fever and rabies was **low**. However, Q-fever was diagnosed in a small number of personnel after they returned to the U.S.

Medical Implications: Q-fever is generally an acute febrile disease. However, considerable variation in severity and duration may be seen; infections may be unapparent or present as a nonspecific undifferentiated febrile syndrome or as pneumonia. Q-fever should be considered in the differential diagnosis of an undifferentiated febrile syndrome when personnel mention a history of being near or in areas where animals were kept or had been kept.

The incubation period for rabies is typically 1–3 months, but may be more than one year in rare instances.

Confidence in the risk assessment: Confidence in risk assessment is **high**.

7 Venomous Animals/Insects

All information was taken directly from the Clinical Toxinology Resources web site (http://www.toxinology.com) from the University of Adelaide, Australia and from the Armed Forces Pest Management Board Living Hazards Database (http://www.afpmb.org/content/living-hazards-database). The species listed below have home ranges that overlap the location of Qatar and may have presented a health risk if they were encountered by personnel. Personnel at AUAB experience minimal sightings or contact.

7.1 Short-term (acute) health risk:

7.1.1 Spiders: Numerous species of spiders are found in AUAB. The Black Widow Spider (*Latrodectus lugubris*) is the only known species whose bite presents a threat. Widow spider bites are mostly minor and even significant envenomation is unlikely to be lethal. Bite is usually felt as a "sting", with delayed (10+min) local pain, and sweating. More severe envenomation may produce regional pain, tender draining lymph nodes, nausea, hypertension, and malaise. Health risk was **low**.

7.1.2 Scorpions: Numerous species of scorpion are found in AUAB. The majority of scorpions found in the region have stings that cause only short lived local effects, such as pain, without systemic effects. Serious envenomations may result in numbness, frothing at mouth, difficulty breathing, and convulsions. Various factors influence the severity of the envenomation to include health and age of patient, sting site, and size and age of scorpion. Most scorpion venom is neurotoxic with a mixture of other substances. If the patient is allergic to bee and wasp stings, extreme caution and care must be taken to prevent excessive morbidity and even possibly death. The following three scorpions are listed as present at AUAB and have known detrimental health effects:

- Androctonus crassicauda (Black Scorpion): Severe envenoming possible, potentially lethal. Cardiotoxicity may be direct or indirect, but is a feature of severe envenoming, with cardiac arrhythmias, cardiac failure.
- Buthacus yotvatensis, Buthacus lepochelys, Compsobuthus arabicus, Orthochirus scrobiculosus: There are a number of dangerous Buthid scorpions, but also others known to cause minimal effects only. Without clinical data it is unclear where this species fits within that spectrum.

Overall health risk from scorpions is **low**.

7.1.3 Snakes: Numerous species of snakes are found in AUAB. A number of poisonous snakes have been encountered to include cobras, pit vipers, and vipers. Vipers are the most significant type of snakes that pose a health risk if encountered and possess highly toxic venom. The following list is not an all-inclusive list of snakes in the area, but rather those deemed most significant or potentially encountered:

- Astrotia stokesii (Stokes' Sea Snake), Enhydrina schistosa (Beaked Sea Snake), Hydrophis cyanocinctus (Asian Annulated Sea Snake), Hydrophis gracilis (Graceful Small-headed Sea Snake) Hydrophis lapemoides (Persian Gulf Sea Snake) Hydrophis ornatus (Reef Sea Snake), Hydrophis spiralis (Yellow Sea Snake), Lapemis curtus (Shaw's Sea Snake), Pelamis platurus (Yellow Bellied Sea Snake), Thalassophina viperina (Olive Sea Snake): Sea snake bites vary from trivial to lethal envenoming.
  Cerastes gasperettii (Gasperetti's Horned Sand Viper): Significant local effects and systemic

effects, including coagulopathy can occur.
- Echis coloratus (Burton's carpet viper), Echis sochureki (Sochurek's Saw-scaled Viper), Macrovipera lebetina (Blunt-nosed Viper): Severe envenoming possible, potentially lethal.

Overall health risk from snakes is **low**.

7.1.4 Snails/Fish: Numerous species of snails and fish are found in AUAB. The following list is not an all-inclusive list of snails or fish that cause envenomations and/or contain neurotoxins:
- Conus textile (Snails): Serious & painful envenomations (sometimes fatal) usually occur when swimmers (waders) pick up shells with live snails still inside
- Synanceja trachynis (Stone fish), Pterois volitans (Lionfish): Very potent neurotoxin w/ cytotoxic & possibly hemolytic factors

Overall health risk from snails/fish is **low**.

7.2 Long-term (chronic) health risk:

No long-term health risks were identified based on available data.

Risk assessment: The long-term risk associated with venomous animals/insects is **low** based on disease incident reporting from AUAB.

Medical implications: Long-term health effects resulting from interaction with venomous animals/insects is **Low**, based on efficacy of control measure as evidenced by lack of disease(s) reported in various medical surveillance data bases e.g, TMDS, MERS, DRSi as per incident reporting from AUAB.

8 Heat/Cold Stress

8.1 Site-Specific Conditions

Summer (March through October) brings dust storms and high temperatures. The health risk of heat stress/injury based on temperatures alone is **Low** (< 78 °F) in December - January, **High** (82-87.9°F) in February and November, and **Extremely High** (≥ 88°F) from March – October. However, work intensity and clothing/equipment worn pose greater health risk of heat stress/injury than environmental factors alone (Goldman, 2001).

Personnel are educated on dangers of heat stress, water intake, work/rest cycles, and other preventive measures.

8.2 Heat

8.2.1 Heat Exposure Guidelines

The risk of heat injury is based on the Wet Bulb Globe Temperature Index as follows:
Low (80-84.9 °F)
Moderate (85-87.9°F)
High (88-89.9°F)
Extremely High (≥ 90°F)

8.2.2 Short (acute) and long-term (chronic) health risk:

Approach: No heat casualty, medical event reports involving heat injuries or heat stress monitoring data were available in the Defense Occupational and Environmental Health Readiness System or the Military Exposure Surveillance Library for any of the camps covered in this assessment. Accordingly, risk estimates are based strictly on existing climatologic data.

Risk Summary:

Short-term (acute) health risk: The short-term health risk of heat injury for unacclimatized individuals (i.e. on site less than four weeks) from March to October was **high**. For the remainder of the year, health risk was **low**. Health risk for persons with underlying health conditions may be elevated above these baselines, especially during May-September.

Long-term health risk: The long-term health risk is **low**.

Medical implications: Severity of heat injury can range from mild clinical signs such as clamminess, nausea, disorientation or headache to life threatening symptoms requiring hospitalization. Long-term medical implications from heat injuries are rare but can occur, especially from more serious injuries such as heat stroke. Individuals with a history of heat injury, even when medical attention was not sought, are at increased risk for future heat injury; repeat heat injury may have increased severity.

Confidence in the risk assessment: Based on generally available information on climatic conditions and the absence of reported heat injuries, confidence in risk assessment is high. Individuals who experienced mild symptoms of heat injury may not have sought medical attention; this may lead to an underestimation of the risk.

8.3 Cold

Even on warm days there can be a significant drop in temperature after sunset by as much as 40 °F. There is a risk of cold stress/injury when temperatures fall below 60 °F, which can occur from November to March. The health risk assessment for non-freezing cold injuries (chilblain, trench foot, and hypothermia) is **Low** based on historical temperature and precipitation data. Frostbite is unlikely to occur because temperatures rarely drop below freezing. As with heat stress/injuries, cold stress/injuries are largely dependent on operational and individual factors instead of environmental factors alone. With protective measures in place the health risk assessment is **low** for cold stress/injury.

8.3.1 Short (acute) and long-term (chronic) health risk:

Approach: No cold injury data were available in the Defense Occupational and Environmental Health Readiness System or the Military Exposure Surveillance Library for any of the camps covered in this assessment. Accordingly, risk estimates are based strictly on existing climatologic data.

Risk Summary: The risk for cold stress/injuries is largely dependent on clothing/equipment worn, operational work intensity and individual factors rather than environmental factors alone. The acute and chronic risk for non-freezing cold injuries, such as chilblain, trench foot, and hypothermia was **low**.

Short-term (acute) health risk: The short-term risk for any cold injury was **low**.

Long-term health risk: The long-term risk for any cold injury was **low**

Medical implications: The cooling of body parts may result in various cold injuries - nonfreezing injuries, freezing injuries and hypothermia which is the most serious. Toes, fingers, ears and nose are at greatest risk because these areas do not have major muscles to produce heat. In addition, the body will preserve heat by favoring the internal organs and thus reducing the flow of blood to the extremities under cold conditions. The most severe cold injury is hypothermia which occurs from excessive loss of body heat and the consequent lowering of the body's core temperature.

Confidence in the risk assessment: Based on generally available information on climatic conditions and the absence of reported cold injuries, confidence in risk assessment is **high**. Individuals who experienced mild symptoms of cold injury may not have sought medical attention; this may lead to an underestimation of the risk.

9 Noise

9.1 Continuous

Occupational and Environmental Health Assessments at AUAB indicate the potential for hazardous noise when working on or near the flightline and/or industrial shops. Appropriate hearing protection is provided for all individuals in shops which generate or are exposed to hazardous noise. Site-specific workplace surveillance data is available in DOEHRS and/or MESL.

9.1.1 Exposure Guidelines:

The Services have established occupational exposure limits (OEL) for continuous or intermittent noise at 85 decibels on the A-weighted scale (dbA), 84 dbA for the Navy, as an eight hour time-weighted average (TWA). The A-weighted scale of noise measurement is used because it mimics the human ear's response to sound. All Services require that individuals routinely exposed to noise levels greater than the OEL be enrolled in the hearing conservation program. Generally, routinely exposed is defined as when the TWA exceeds 84 dB(A) on average more than 2 days in any month.

9.1.2 Site-Specific Conditions:

Sources of potential noise include flight line operations, associated with both fixed and rotary wing aircraft, tactical generators and various hand tools in maintenance shops. Due to the inherent noise hazard in flight line operations, personnel are required to wear dual hearing protection.

9.1.3 Short (acute) and long-term (chronic) health risk:

Approach: Knowledge of the Service hearing conservation programs and typical sound pressure level measurements associated with the various potential noise generating sources were used to complete the health risk assessment.

Risk Summary:

Short-term health risk: The short-term risk of noise induced hearing loss with the use of appropriate hearing protection use is **moderate**. Few exposed individuals are expected to have experienced noticeable short-term health effects such as annoyance, speech interference, fatigue and temporary hearing threshold shifts during deployment.

Long-term health risk: The long-term risk of noise induced hearing loss with appropriate hearing protection use is **moderate**.

Confidence in the Risk Assessment: Confidence in the health risk assessment is **high.** There is a well-established hearing conservation program; hearing protection is readily available and generally worn by individuals with known occupational exposures across the Services. However, the limited availability of information about specific noise sources and enforcement of the use of personal protective equipment diminishes confidence.

9.2 Impulse

While some potential for impulse noise may be from shop equipment, most of the exposure is limited to certain specialties (i.e. Security Forces, Explosive Ordinance Disposal, etc.). These workplace-specific exposures are documented in DOEHRS.

9.2.1 Short-term (acute) and Long-term (chronic) health risks:

Due to available data, the short and long-term risk of impulse noise with appropriate hearing protection is **moderate**.

10 Unique Concerns

10.1 Mold

Mold growth in facilities at AUAB is common due to climatic conditions and frequent HVAC use.

Approach – Per EPA and the CDC, mold is only sampled at the request of a physician when an individual is experiencing medical symptoms. No sampling of mold has occurred at AUAB. When mold is present, the mold is remediated and the source of moisture is eliminated.

Risk Summary: Low– The health risk associated with mold is low. Regardless of type of mold present, mold is a low health risk to a healthy population. Both short and long-term risk effects are low.

Medical Implications: Individuals who are sensitive to mold may experience allergic airway symptoms.

Confidence in the Risk Assessment: Confidence in this risk assessment is high based on World Health Organization, Environmental Protection Agency, and Center for Disease Control guidance and research.

10.2 Potential Environmental Contamination Sources

In addition to environmental exposures already discussed, there may be specific occupational exposure pathways associated with aircraft, vehicle and site maintenance. Typical chemicals of concern associated with potential occupational exposures were petroleum, oils, and lubricants. No industrial hygiene data exist to document the significance of occupational exposures; however, there were typically procedures in place for storage, handling, use and disposal of hazardous materials which generally minimize health risk.

Approach: DoD personnel are exposed to various chemical, physical, ergonomic, and biological hazards in the course of performing their mission. These types of hazards depend on the mission of the unit and the operations and tasks which the personnel are required to perform to complete their mission. These process and hazards are identified and evaluated in DOEHRS for the corresponding work centers.

Regulated hazardous medical waste (red-bagged) is collected and incinerated onsite. Solid waste is primarily being disposed of through a host nation contractor. Currently, proper handling, storage, and disposal of industrial waste generated on base are coordinated at the unit level with long term storage at the hazardous material/waste storage site. No obvious signs of major spills or tank leakage were noted when coalition forces occupied Al Udeid. There are a few chemical latrines on base of which they are plumbed and sewage is pumped to black water storage tanks then pumped into trucks for disposal off-base. No specific health risks associated with these waste management operations have been identified. No significant incidents have occurred at AUAB regarding fuel, petroleum or industrial chemical spills.

10.2.1 Short (acute) and long-term (chronic) health risks:

Risk Summary: Medium – The health risk associated with these hazards depends on a number of elements including what materials are used, how long the exposure lasts, what is done to the material, the environment where the task or operation is performed, and what controls are used.

Medical implications: Exposures to these occupational hazards can occur through inhalation (air), skin contact, or ingestion; however exposures through air are generally associated with the highest health risk.

Confidence in the risk assessment: Confidence in the risk assessment is low. Typical chemicals of concern associated with potential occupational exposures are petroleum, oils, and lubricants. These were generally present in relatively low volumes. Procedures for storage, handling, use and disposal of hazardous materials were in place throughout the theater of operations to minimize health risk.

10.3 Pesticides/Pest Control

Much of the pest control at this site consists of trapping and small area treatment for ants, spiders and rodents with baits, glue boxes and pyrethroids. Larvicides are used for mosquito larval control. Some limited area residual pest control is performed to control mosquitoes in isolated locations. Personnel may have been incidentally exposed to very low levels of pesticide during pest control operations.

10.3.1 Short and Long-term health risks:

Approach: The Integrated Pest Management Plan for Qatar was reviewed for compliance with DoDI 4150.07 requirements. In addition, U. S. military entomologists who served at AUAB and the Navy Entomology Center of Excellence were consulted about their knowledge of pest management activities at these camps.

Risk Summary: Low, based on available data

Short-term health risk: No short-term health risk was identified based on available data.

Long-term health risk: No long-term health risk was identified based on available data.

Confidence in the risk assessment: Confidence in the risk assessment is **high**. The integrated pest management plan emphasizes non-chemical control over the use of chemical pesticides. The potential for camp residents to come in contact with improperly formulated insecticides is remote.

10.4 Asbestos and Lead-Based Paint

10.4.1 Site-Specific Conditions:

There is no specific information available to assess the asbestos hazard. Lead-based paint was used at AUAB. All areas have not been identified where LBP may be present. Bioenvironmental Engineering has an inventory of facilities where LBP has been discovered. CE Environmental does not maintain an inventory. Facilities are well-maintained and there are no known areas were paint is flaking or peeling. Any previously flaking or peeling areas were mitigated.

10.4.2 Short-term (acute) health risk:

Risk Summary: Low, based on available data.

Medical Implications: None - No data was available upon which to base a risk assessment specific to AUAB.

Confidence in the risk assessment: High, based on available data.

10.4.3 Long-term (chronic) health risk:

Risk Summary: Low, based on available data.

Medical Implications: None - No data was available upon which to base a risk assessment specific to AUAB.

Confidence in the risk assessment: High, based on available data.

10.5 Burn Pit

AUAB does not have any burn pits; however, occasional burning does occur. The burning consists of only papers and occurs infrequently, no more than one 55 gallon drum. There are no generalized impacts from these burn operations. The EMDG has two small medical waste incinerators but there are no populations at risk from when these operate because of their location and the prevailing winds.

10.5.1 There are currently no burn pits in operation at Al Udeid AB.

10.5.2 Exposure Guidelines: N/A

10.5.2.1 Sample data/Notes: N/A

10.5.2.2 Short-term health risks: None identified.

10.5.2.3 Long-term health risk: None identified.

11 References

POEMS developed according to:

1. DoDI 6490.03, *Deployment Health*, 2006.
2. JCSM (MCM) 0028-07, *Procedures for Deployment Health Surveillance,* 2007.
3. DoDI 6055.05, Occupational and Environmental Health, 2008.
4. Klaassen, C.D. *Casarett & Doull's Toxicology: the Basic Science of Exposures*, Chapter 2, Principles of Toxicology; Fifth Edition, McGraw Hill, New York.

Site description and baseline information obtained from:

5. Occupational and Environmental Health Site Assessment for Base Camp Al Udeid Air Base, Qatar, Survey ID: 242063, August 4, 2014.

Sampling data were obtained from the:

6. Defense Occupational and Environmental Health Readiness System (referred to as the DOEHRS-EH database) at https://doehrs-ih.csd.disa.mil/Doehrs/. Some of the data may be classified or otherwise have some restricted distribution. See discussion below.
7. Military Exposure Surveillance Library: https://mesl.apgea.army.mil/mesl/. Some of the data and reports used may be classified or otherwise have some restricted distribution.

Additional environmental health reports/survey documents are from the:

8. Al Udeid Air Base – Wikipedia https://en.wikipedia.org/wiki/Al_Udeid_Air_Base
9. Qatar – Al Udeid Air Base – GlobalSecurity.Org - http://www.globalsecurity.org/military/facility/udeid.htm

Chemical hazards (air, water, soil) evaluated based on military exposure guidelines (MEGs) and risk assessment methodology in:

10. USACHPPM June 2010 Revision, Technical Guide (TG230), "Environmental Health Risk Assessment and Chemical Exposure Guidelines for Deployed Military Personnel". For further information, contact USAPHC Environmental Health Risk Assessment Program at: commercial 410-436-2953 or DSN 584-2953.
11. Department of the Army Technical Bulletin Medical (TB MED) 577, Sanitary Control and Surveillance of Field Water Supplies, TB Med 577, NAVMED P-5010-10, AFMAN 48-138, 1 May 2010.
12. USACHPPM, Particulate Matter Factsheet No. 64-009-0708, 2008.

Regional/country information on endemic/infectious disease and heat/cold from the:

13. Centers for Disease Control and Prevention (CDC) Travelers' Health website (http://wwwnc.cdc.gov/travel/destinations/traveler/none/qatar), "Destinations" section, Qatar
14. World Health Organization (WHO) World Malaria Report 2012, page 141.
15. "Cutaneous Leishmaniasis in U.S. Military Personnel – Southwest/Central Asia, 2002-2003." Morbidity and Mortality Weekly Report (MMWR), October 24, 2003 / 52(42);1009-1012. http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5242a1.htm
16. Hartzell JD, Peng SW, Wood-Morris RN, Sarmiento DM, Collen JF, Robben PM, et al. Atypical Q fever in US soldiers. Emerg Infect Dis [serial on the Internet]. 2007 Aug. Available from http://wwwnc.cdc.gov/eid/article/13/8/07-0218.htm

12 Where Do I Get More Information?

If a provider feels that the Service member's or Veteran's current medical condition may be attributed to specific OEH exposures at this deployment location, he/she can contact the Service-specific organization below. Organizations external to DoD should contact Deputy Assistant Secretary of Defense for Health Readiness Policy and Oversight (HRP&O).
Army Public Health Center (Provisional) Phone: (800) 222-9698. http://phc.amedd.army.mil/
Navy and Marine Corps Public Health Center (NMCPHC) (formerly NEHC) Phone: (757) 953-0700. http://www.med.navy.mil/sites/nmcphc/Pages/Home.aspx
U.S. Air Force School of Aerospace Medicine (USAFSAM) (formerly AFIOH) Phone: (888) 232-3764. http://www.wpafb.af.mil/afrl/711hpw/usafsam.asp
DoD Health Readiness Policy and Oversight (HRP&O) Phone: (800) 497-6261. http://fhpr.dhhq.health.mil/home.aspx