Military Deployment
Periodic Occupational and Environmental Monitoring Summary (POEMS):
Al Udeid Air Base, Qatar

AUTHORITY: This POEMS has been developed in accordance with Department of Defense (DoD) Instructions 6490.03, *Deployment Health*, 2006, 6055.05, Occupational and Environmental Health, 2008, and JCSM (MCM) 0028-07, *Procedures for Deployment Health Surveillance,* 2007.

NOTE: This is a correction to the POEMS dated 21 December 2010. There was an error in the calculation for long term risk assessment for PM 2.5. The correction is reflected in this POEMS and the December 2010 version should be considered invalid.

PURPOSE: This POEMS documents the DoD assessment of base camp level occupational and environmental health (OEH) exposure data for Al Udeid Air Base. It presents the identified health risks and associated medical implications. The findings are based on information collected from July 2004 – September 2010 to include OEH sampling and monitoring data (e.g. air, water, and soil), field investigation and health assessment reports, as well as country and area-specific information on endemic diseases. While this assessment may reflect similar exposures and risks pertaining to historic or future conditions at this site, the underlying data is limited to the time period(s) and area(s) sampled and thus may not reflect fluctuations or unique occurrences. It also may not be fully representative of all the fluctuations during the timeframe. To the extent data allow, this summary describes the general ambient conditions at the site and characterizes the risks at the *population–level*. While useful to inform providers and others of potential health effects and associated medical implications, it does not represent an individual exposure profile. Actual individual exposures and specific resulting health effects depend on many variables and, should be addressed in individual medical records by providers as appropriate at the time of an evaluation of a unique exposure.

SITE DESCRIPTION:

Al Udeid AB 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, North 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. AFCENT Forward HQ is also located in the BPC area, along with the hospital. Ops and Log Town both provide base support functions, while the North Ramp consists of both AFCENT Forward Special Operations Command and the Combined Air Operations Center, as well as wing HQ. Munitions is 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.

The land on and surrounding Al Udeid is generally flat with slightly rolling hills. The base is located within a low desert plain, with the Persian Gulf 30 km to the east. The terrain is desert with sparse vegetation. The topography of the area is gently sloping with total elevation difference approximately six meters. The soil is composed of sand, gravel, and rocks with little organic material mixed in. A one-meter layer of solid limestone and aggregate calcification exists approximately one to two meters below the surface. Small cobbles of this aggregate are often brought to the surface through shallow excavation. Below two meters, the soil is composed mainly of sand. Surface soil is hard packed. Vegetation is extremely sparse and is limited to desert scrub.

SUMMARY: The tables on the following pages provide a list of the overall identified health risks at Al Udeid Air Base. Summarized below are the key health risks estimated to present a Moderate or greater risk of medical concern along with recommended follow-on medical actions that providers should be aware. As indicated in the detailed sections that follow, the controls that have been effectively established to reduce risk levels have been factored into this overall assessment. In some cases, e.g. ambient air, specific controls are noted but not routinely available/feasible. The Health Risk Matrix table provided below outlines the methodology for determining if a

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health risk is Extremely High, High, Moderate or Low, based on the probability (how likely to occur) and severity (how the health hazard affects healthy military members and corresponding mission impact).

Short-term health risks & medical implications: The following sources of health risk may have caused acute effects in some personnel during deployment at Al Udeid: inhalable coarse particulate matter less than 10 micrometers in diameter (PM_{10}); food/waterborne diseases (e.g., diarrhea); other endemic diseases (e.g., sandfly fever and cutaneous leishmaniasis), and heat stress.

If ingesting local food and water, food/waterborne disease resulting in diarrhea can temporarily incapacitate personnel. For heat stress, risk can be greater for susceptible persons including those older than 45, of low fitness level, or with underlying medical conditions. Risks from food/waterborne diseases, and heat stress can be reduced with preventive medicine controls and mitigation.

For PM_{10}, certain subgroups of the deployed forces (e.g., those with pre-existing asthma/cardio pulmonary conditions) are at greatest risk of developing notable health effects. Although most effects from exposure to PM_{10} and chemical pollutants should have resolved post-deployment, providers should be prepared to consider the relationship between deployment exposures and current complaints. Some individuals may have sought treatment for acute respiratory irritation during their time at Al Udeid. Personnel who reported with symptoms or required treatment while at this site should have exposure/treatment noted in medical record on a Standard Form (SF) 600 (*Chronological Record of Medical Care*) or equivalent.

Long-term health risks and medical implications: The types of hazards associated with potential long-term health effects at Al Udeid include inhalable fine particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$), visceral leishmaniasis and for certain populations, continuous noise.

For noise hazards, providers should consider any potential unique individual exposures (such as occupational or specific personal dosimeter data) when assessing individual concerns. For example, at all bases certain individuals need to be followed/evaluated for specific occupational exposures/injuries (e.g., annual audiograms as part of the medical surveillance for those enrolled in the Hearing Conservation Program; and personnel covered by Respiratory Protection Program and/or Hazardous Waste/Emergency Responders Medical Surveillance).

Where Do I Get More Information?

If a provider feels that the Service member's or Veteran's current medical condition may be attributed to specific OEH exposures at this deployment location, he/she can contact the Service specific organization below. Organizations external to DoD should contact DoD Force Health Protection and Readiness (FHP & R).

US Army Public Health Command (Provisional) (USAPHC (Prov) (formerly the US Army Center for Health Promotion and Preventive Medicine (USACHPPM)) Phone: (800) 222-9698 http://phc.amedd.army.mil/Pages/default.aspx	**Navy and Marine Corps Public Health Center (NMCPHC)** (formerly NEHC) Phone: (757) 953-0700 http://www-nehc.med.navy.mil	**US Air Force School of Aerospace Medicine (USAFSAM)** (formerly AFIOH) Phone: (888) 232-3764 https://kx.afms.mil/esoh	**DoD Force Health Protection and Readiness (FHP & R)** Phone: (800) 497-6261 http://fhp.osd.mil
Occupational and environmental sampling data are available in Defense Occupational and Environmental Health Readiness System (DOEHRS) at https://doehrs-ih.csd.disa.mil/Doehrs/. Additional environmental health reports/information are in the DoD OEHS Data Portal: https://doehsportal.apgea.army.mil/doehrs-oehs/. Regional/country info on endemic/infectious disease from National Center for Medical Intelligence (NCMI) is at https://www.intelink.gov/ncmi/index.php			

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POEMS

Population-Based Health Risk Estimates – Al Udeid Air Base, Qatar[1, 2]

Sources of Identified Health [3]	Health Risk Assessment Summary [4]	
	Short Term Health Risk	**Long Term Health Risks**
AIR	**Airborne Substances – Overall Short Term Risks: Variable Low to High**	**Airborne Substances – Overall Long-Term Risks: Moderate**
Particulate matter (PM_{10})	Variable (Low to High).	Not evaluated-no available health guidelines.
Particulate matter ($PM_{2.5}$)	Variable (Low to Moderate).	Low.
Metals	Low	Low
Chemical Pollutants	Low	Low
SOIL	**Soil - Overall Short Term Risks: Not Evaluated**	**Soil - Overall Short Term Risks: Low**
Metals, organic and inorganic compounds	Not evaluated per current USAPHC protocols.	Low
WATER	**Waterborne Substances – Overall Short Term Risks: Not Evaluated**	**Waterborne Substances – Overall Long Term Risks: Not Evaluated**
Used for Drinking	Not evaluated – Not enough data	Not evaluated – Not enough data
Used for Other Purposes	Not evaluated – Not enough data	Not evaluated – Not enough data
MILITARY UNIQUE	**Military Unique – Overall Short Term Risks: Low**	**Military Unique – Overall Long Term Risks: Low**
(e.g. CBRN; Depleted Uranium; Ionizing/Non ionizing radiation)	None Identified	None Identified
ENDEMIC DISEASE	**Endemic Disease – Overall Short Term Risks: Low - High**	**Endemic Disease – Overall Long Term Risks: Low - Moderate**
Food borne/Water borne (e.g., diarrhea-bacteriological)	Variable (Low to High) High Risk*:* Bacteria: Enterotoxigenic Escherichia coli*,* Campylobacter*,* Shigella*, and* Salmonella are the most common. Moderate Risk: Protozoa (Cryptosporidium, Entamoeba histolytica*, and* Giardia lamblia), Hepatitis A, Typhoid. Risk reduced to None with preventive medicine measures, which include Hepatitis A and typhoid fever vaccination. Low Risk: Brucellosis & Hepatitis E	None Identified
Arthropod Vector Borne	Variable (Low to Moderate) 1. Moderate Risk: Crimean-	Moderate: Leishmaniasis- visceral infection

	Congo Hemorrhagic Fever 2. Low risk: Leishmaniasis, Cutaneous, Leishmaniasis, Visceral, Rickettsioses, tick-borne (spotted fever group), Sandfly Fever, West Nile Fever	
Respiratory	Variable risk (Low to Moderate) 1. Moderate risk: Tuberculosis 2. Low risk: Meningococcal meningitis	A TB skin test is required post-deployment if potentially exposed to TB.
Water-Contact (e.g. wading, swimming)	Moderate Risk: Leptospirosis	None Identified
Animal Contact	Variable (Low to Moderate) 1. Moderate Risk: Q Fever 2. Low Risk: Rabies ;	None Identified
VENOMOUS ANIMAL/INSECTS	**Venomous Animals/Insects – Overall Short Term Risks: Low**	**Venomous Animals/Insects – Overall Long Term Risks: Low**
Snakes, scorpions, and spiders	Snakes, scorpions, and venomous fish are all present in Qatar.	None Identified
HEAT/COLD STRESS	**Heat/Cold - Overall Short Term Risks: Low to High**	**Heat/Cold- Overall Long Term Risks: Low**
Heat	Variable (Low to High). Risk reduced to moderate with preventive medicine controls/mitigation	None Identified
NOISE	**Noise – Overall Short Term Risks: Low**	**Noise – Overall Long Term Risks: Low to Moderate**
Continuous	Low	Moderate: Those working flight line with no hearing protection.
Impulse	None Identified	None Identified
OTHER	**Other – Overall Short Term Risks: Low**	**Other – Overall Long Term Risks: Low**
(e.g. Pesticides, asbestos, lead-based paint, waste disposal)	Low	Low
UNIQUE INCIDENT/CONCERNS	**Unique Incident/Concerns – Overall Short Term Risks: Low**	**Unique Incidents/Concerns– Overall Long Term Risks: Low**
2005 Bunker Evaluation	Low	Low
This summary table provides a qualitative estimate of population-based short- and long-term health risks associated with the general ambient and occupational environment conditions at Al Udeid Air Base. It does not represent a unique 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 exposure documented in an SF600 or equivalent.

[2] This assessment is based on specific data and reports obtained from the July 2004 – September 2010 timeframe. It is considered a current representation of general site conditions but may not reflect certain fluctuations or unique exposure incidents. Short term health risk estimates are generally consistent with field-observed health effects.

[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 Al Udeid Air Base. The health risks are presented as Low, Moderate, High or Extremely High for both short term and long term 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 of the exposure that would produce such health effects. Details can be obtained from the USAFSAM. Where applicable, "None Identified" is used when though an exposure was identified, no risk of either a specific acute or chronic health effects were determined. More detailed descriptions of OEH exposures that were evaluated but determined to pose no health risk are discussed in the following sections of this report.

[4] Risks in this summary table are based on quantitative surveillance thresholds 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 select few samples.

[5] Risks for endemic diseases and host/vector/pathogen surveillance are based on the National Center for Medical Intelligence's Risk Assessment Methodology found at https://www.intelink.gov/ncmi/index.php

REFERENCES: Al Udeid Air Base, Qatar POEMS

POEMS developed according to:

1. DoDI 6490.03, *Deployment Health*, 2006.

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

3. CJCS (MCM) 0028-07, *Procedures for Deployment Health Surveillance,* 2007.

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. Al Udeid Air Base Occupational and Environmental Health Site Assessment, dated June 2010

Sampling Data were Derived From:

6. Defense Occupational and Environmental Health Readiness System (referred to as the DOEHRS 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.

Additional environmental health reports/survey documents are from the:

7. DOD OEHS Data Portal: https://doehsportal.apgea.army.mil/doehrs-oehs/ . Some of the data and reports used may be classified or otherwise have some restricted distribution.

8. USACHPPM TG230, 2010 Revision, Chemical Exposure Guidelines for Deployed Military Personnel 12.

9. USACHPPM, Particulate Matter Factsheet No. 64-009-0708, 2008. *Regional/country information on endemic/infectious disease and heat/cold from the:*

10. National Center for Medical Intelligence (NCMI) Web site is: https://www.intelink.gov/ncmi/index.php

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NOTE. The DOEHRS database was queried to obtain the available sample data for air, soil, and drinking and nondrinking water sources at Al Udeid. The data are assessed using the TG 230,June 2010 Revision and MEGs. The general method involves an initial check of the data which eliminates all chemical substances not detected above 1-year negligible MEG. Those substances screened out are not considered acute or chronic health hazards so are not assessed further. For remaining substances, acute and chronic health effects are evaluated separately for air and water (soil is only evaluated for long-term health risk). This is performed by deriving separate short-term and long-term population exposure level estimates (referred to as population exposure point concentrations (PEPC) that are compared to MEGs derived for similar exposure durations. If less than or equal to negligible MEG, the risk is Low. If levels are higher than negligible, then there is a chemical-specific toxicity and exposure evaluation by appropriate subject matter experts, which includes comparison to any available marginal, critical, or catastrophic MEGs. For drinking water, 15 liters/day (L/day) MEGs are used for the screening while site specific 5–15 L/day are used for more detailed rate' is limited to 2L/day (similar to the US Environmental Protection Agency (USEPA)), which is derived by multiplying the 5-L/day MEG by a factor of 2.5. This value is used to conservatively assess nondrinking uses of water.

Discussion of Health Risks at Al Udeid Air Base by Source

The following tables describe the major source categories of potential health risk that were evaluated at Al Udeid Air Base. For each category, the evaluation process includes identifying what, if any, specific sub-categories/health concerns are present. This initial step results in "screening out" certain sub-categories that pose no identifiable health risk (for example if all data is below screening levels). While these tables identify sub-categories that have been determined to present no identifiable health risk, the summary table on the previous page only contains those sub-categories that were determined to pose some level of potential health risk.

Limitations:

1. Sampling data used for this assessment is derived from USAPHC-Main only. Analyses conducted by USAPHC-Europe were not included due to database compatibility issues.
2. The health risk assessments are based on retrospective analysis of sampling data and limited field notes. Assumptions regarding representativeness and duration of exposure were necessary.
3. In general, samples weren't collected with the intent of characterizing a mean and/or range of exposures. The data presented in the POEMS represents the mean of the existing sampling data, not the mean exposure. The same is true for the percentages at each risk level (i.e. The percentages do not indicate the percentage of days that exceeded a MEG. The percentages represent the number of samples collected that exceed the MEG.)

<table>
<tr><td colspan="3">1. AIR</td></tr>
<tr><td colspan="3">Site-Specific SOURCES Identified (all those checked):</td></tr>
<tr><td>☒Wind-Blown Sand</td><td>☒Commercial Industry</td><td>☒Other: Vehicles</td></tr>
<tr><td>☐Burn Pits</td><td>☐Agricultural</td><td>☐Not Determined</td></tr>
<tr><td colspan="3">Personnel deployed to Al Udeid are exposed to various airborne constituents. These have been identified through monitoring and sampling efforts between May 2004 and May 2008. Windblown dust, and sand along with minimal industrial operations contribute to PM exposures above health-based MEGs. Industrial activities, including construction, fuel storage and distribution, water and wastewater treatment, and concrete and asphalt production, located on and around the base may contribute air contaminants. There are no open burning operations at Al Udeid.</td></tr>
<tr><td colspan="3">Assessment of Data and Identified Risks</td></tr>
<tr><td rowspan="2">Particulate matter, 10 microns (PM_{10})

(See USACHPPM Fact Sheet No. 64-009-0708 Particulate Matter Air Pollution Exposures During Military Deployments for more details)</td><td colspan="2">Sample Data/Notes: Exposure Guidelines: Short-term (24-hour) PM_{10} MEGs micrograms per cubic meter (µg/m^3): Negligible MEG=250, Marginal MEG=420, Critical MEG=600; Long-term (1-year) PM10 MEG: Not Available (see long term risk note).
Degree of risk is estimated based on comparison of concentrations to specified MEGs.

The range of 24-hour PM_{10} concentrations in 64 samples from May 2004 through May 2008 was 32.5 to 1803.5 µg/m^3. The average concentration was 184 µg/m^3, the standard deviation was 263.8 µg/m^3 and the median was 119.1 µg/m^3. There were no sample results available for 2003, 2005, 2009 or 2010.</td></tr>
<tr><td colspan="2">Short Term Health Risk: Variable Low to High. Short term risk is based on comparison of daily concentrations to 24-hour MEGs. The variability in the risk is due to significant fluctuation in daily concentrations.

Overall, 54/58 (93%) sampling days with concentrations less than the 24-hour negligible MEG (LOW Risk), 3/58 (5%) sampling days with concentrations between the 24-hour negligible and marginal MEGs (LOW Risk), 0 sampling days between the marginal and critical MEGs, and 2/58 (3%) sampling days with concentrations greater than the critical MEGs (HIGH Risk). Confidence = low - medium based on</td></tr>
</table>

	small data set and limitations in sampling data. This risk assessment includes data from 2004 and 2006 only due to insufficient data from other years. 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 respiratory effects (sneezing, adaptive responses such as coughing, sinus congestion and drainage) that can be exacerbated by increased activity. These effects are consistent with those generally reported from the field.
	Long Term Health Risk: Not evaluated-No available health guidelines. The USEPA has retracted its long-term standard (National Ambient Air Quality Standards [NAAQS]) for PM10 due to an inability to clearly link chronic health effects with long-term PM10 exposure levels.
Particulate matter, 2.5 microns ($PM_{2.5}$) (See USACHPPM Fact Sheet No. 64-009-0708 Particulate Matter Air Pollution Exposures During Military Deployments for more details)	**Sample Data/Notes:** Exposure Guidelines: Short-term (24-hour) $PM_{2.5}$ MEGs ($\mu g/m^3$): Negligible MEG=65, Marginal MEG=250, Critical MEG=500; Long-term (1-year) PM2.5 MEGs: Negligible MEG=15, Marginal MEG=65. Degree of risk is estimated based on comparison of concentrations to specified MEGs. The range of 24-hour $PM_{2.5}$ concentrations in 45 samples from Feb 2006–May 2007 was 24 to 350 $\mu g/m^3$ with an average of 63 µg/m3, a standard deviation of 49.4 $\mu g/m^3$ and a median of 50.1 $\mu g/m^3$.
	Short Term Health Risk: Variable Low to Moderate. Short term risk is based on comparison of daily concentrations to 24-hour MEGs. The variability in the risk is due to significant fluctuation in daily concentrations. Overall, 26/39 (67%) sampling days had samples with concentrations less than the 24-hour negligible MEG (LOW Risk), 12/39 (31%) sampling days with concentrations between the 24-hour negligible and marginal MEGs (LOW Risk), 1/39 (3%) sampling days between the marginal and critical MEGs (MODERATE Risk), and 0 sampling days with concentrations greater than the critical MEGs. This risk assessment is based on data from 2006 only. There was insufficient data available for other years to be included in the assessment. Confidence in the risk estimate is low to medium due to limitations in sampling data During the highest levels of $PM_{2.5}$, a few personnel may have experienced notable eye, nose, or throat irritation; most personnel would have experienced only mild effects. Preexisting health conditions (e.g., asthma or cardiovascular diseases) may have been exacerbated. On most days, some or all of these same health effects could occur in some personnel, but at even lower amount than those noted above during the highest levels of $PM_{2.5}$.
	Long Term Health Risk: Low. Long-term risk is based on comparison of the yearly average sample concentration to the long-term MEGs. Unlike PM_{10}, long-term $PM_{2.5}$ exposures are potentially associated with certain long-term health consequences. The yearly average $PM_{2.5}$ concentration for 39 samples collected Al Udeid during 2006 was 63 $\mu g/m^3$, which is greater than the 1-year negligible MEG, but less than the 1-year marginal MEG. This risk assessment was based solely on sampling data from 2006. There were no samples analyzed in 2003-2005 or 2008-2010. Additionally, there were insufficient samples results available from 2007 to complete a risk assessment. Confidence in risk estimate is low due to limitations in field data and health effects data.

	With repeated exposures at or above this level, the risk that a small percentage of susceptible personnel may develop chronic conditions (such as reduced lung function or exacerbated chronic bronchitis, chronic obstructive pulmonary disease, asthma, atherosclerosis, or other cardiopulmonary diseases) increases. Those with a history of asthma or cardiopulmonary disease have a higher risk for developing these chronic conditions.
Metals	**Sample Data/Notes:** There were 24 samples from May 2004 – May 2008. Risks are determined based on comparison to available MEGs. None of the analyzed metals were found in concentrations above a short term or long term MEG.
	Short and Long Term Health Risk. Low. All contaminants were measured at concentrations below MEGs. Three contaminants have detection limits greater than the MEG (Beryllium, Cadmium, and Vanadium). Since these contaminants weren't detected in any of the samples and there is no expected source of these contaminants, no further assessment was needed (based on guidance in TG 230 paragraph 3.4.4.4). Confidence in this risk assessment is low based on limitations in sampling data and analytical limits of detection
Chemical Pollutants (gases and vapors)	**Sample Data/Notes:** 5-17 samples were collected for volatile organic compounds in 2005 and 2006 and sent to the USAPHC for analysis. The number of samples varied depending on the contaminant (i.e. some contaminants were analyzed in 5 samples, while others were analyzed in 12 or 17 samples). Risks are determined based on comparison to available MEGs. None of the analyzed contaminants were detected at concentrations above a short or long term MEG. No semi-volatile organic compound samples were collected.
	Short and Long Term Health Risk: Low. All contaminants measured at concentrations below the MEGs. Confidence in this risk assessment is low to medium based on limitations in sampling data.

2. SOIL

Site-Specific SOURCES of Contaminants Identified (all those checked):

☐Waste Site/Burn pits	☐Commercial Industry _____	☐Agricultural
☐Other : vehicles	☐Not Determined	☒None

No evidence of sources that could results in contaminated soil (no pre-existing hazardous waste sites/spills)

Assessment of Data and Identified Risks

Analyses includes metals/inorganics as well as organics	**Sample data/Notes***:* There were 13 soil samples collected in 2004 and sent to USAPHC for analysis. Risks are determined based on comparison to available MEGs. There were no contaminants were detected at levels greater than the 1-year negligible MEG.
	Short Term Health Risk: Currently sampling data for soil is not evaluated in an acute risk assessment.
	Long Term Health Risk: Low. All contaminants measured at concentrations below MEGs. Confidence in this assessment is low based on the relatively small number of samples collected over the time period and limitations in the sampling data.

3a. WATER: Drinking Water

Identified Water Supplies

☒Bottled; Local Procured	☐Military Bottled/Packaged (unknown)	☐ROWPU	☐Municipal Sources

From 2004 – 2010, drinking water supplies at AUAB were from locally procured bottled water sources approved by the US Army Veterinary Command. Veterinary Command personnel inspect bottling plants and conduct sampling Jul 2010. 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. Routine bacteriological field tests are conducted.

Assessment of Data and Identified Health Risks

Analyses include metals/inorganics as well as organics	**Sample Data/Notes:** In addition to the field testing described above, 2 bottled water samples were taken (one in 2004 and one in 2008) and sent to USAPHC for analysis. Risks are determined based on comparison to available MEGs. None of the analytes were found at concentrations greater than a long term or short term MEG.
	Short and Long Term Health Risk: Not enough data available to assess. Two samples over the time period is not considered representative of the characteristics of the water source.

3b. WATER: Used For Other Purposes (Personal Hygiene, Cooking, Showering, etc)

☐Bottled; Local Procured	☐Military Bottled/Packaged (unknown)	☐ROWPU	☒Municipal Sources

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 for cooking and hand washing. Additionally, treated water is used for showers, toilets, personal hygiene, air craft washing, etc. No raw water samples were submitted for laboratory analysis. Routine Field testing is performed by Bioenvironmental Engineering and includes bacteriological, CBRN, FAC, and other parameters per AFI 48-138 and TB MED 577.

Analyses include metals/inorganics as well as organics	Sample Data/Notes: In addition to the field testing described above, 5 treated water samples obtained in May 2004, May 2005, and April 2008 were submitted to the USAPHC for analysis. Risks are determined based on comparison to available MEGs. None of the analytes sampled were found at concentrations above a short term or long term MEG.
	Short and Long Term Health Risk: None identified based on available sampling data. Confidence in this risk assessment is low based on the small data set and limitations in sampling data.

4. MILITARY UNIQUE

Chemical Biological, Radiological Nuclear (CBRN) Weapons:

No specific hazards sources are documented in DOEHRS or the DoD OEHS Portal

***Depleted Uranium (DU)*: None Identified**

DU is a component of some aircraft that are currently on Al Udeid Air Base. However, no abandoned/damaged DU is known to exist. No specific health risks are identified.

Ionizing Radiation: None Identified

No hazards affecting the base population exist. Individual workplaces have sources of ionizing radiation (x-ray or radioactive material sources). Exposures are maintained as low as reasonably achievable and devices are monitored by Bioenvironmental Engineering. Workplace-specific health risks are documented in DOEHRS and/or individual medical records as needed.

Non-Ionizing Radiation: None Identified

No hazards affecting the base population exist. Individual workplaces have sources of non-ionizing radiation (LASERs, radio frequency radiation, etc.) Exposures are maintained as low as reasonably achievable and emitters are monitored by Bioenvironmental Engineering. Workplace-specific health risks are documented in DOEHRS and/or individual medical records as needed.

5. ENDEMIC DISEASE (based on NCMI **[1 Jun 10]** (https://www.intelink.gov/ncmi/index.php)

NOTE: "Risk" level refers to both severity of disease (without controls) and probability of disease based on local rates/endemic status. Diseases described are those presenting greater risk when compared with US conditions. Most identified disease risks can and are being mitigated with military preventive medicine measures/policies.

Food borne and Waterborne Diseases

Sanitation varies with location. Sanitation may approach Western standards in Doha, but typically is well below U.S. standards elsewhere in the country. Local food and water sources (including ice) may be contaminated with pathogenic bacteria, parasites, and viruses to which most U.S. service members have little or no natural immunity. Diarrheal diseases can be expected to temporarily incapacitate a high percentage of personnel within days if local food, water, or ice is consumed. Hepatitis A can cause prolonged illness in a smaller percentage of unvaccinated personnel. In addition, significant outbreaks of viral gastroenteritis (e.g., norovirus) and food poisoning (e.g., *Bacillus cereus*, *Clostridium perfringens*, and *Staphylococcus*) may occur.

Short-Term and Long-Term Health Risk: Low to high risk year round. Force Health Protection (FHP) measures that include vaccination for Hepatitis A and Typhoid, as well as, food sanitation, hand washing, and purchasing food/water from approved sources will reduce the risk.

Arthropod Vector-Borne Diseases

During warmer months (typically April through November), ecological conditions countrywide may support arthropod vectors, including mosquitoes, ticks, and sand flies, with variable rates of disease transmission. A variety of vector-borne diseases occur at low or unknown levels. Individually, most of these diseases are likely to affect only a small percentage of personnel. However, the combined risk may be higher, and many of these diseases have the potential to cause prolonged illness and, in some cases, death.

Most primary Crimean-Congo Hemorrhagic Fever (CCHF) infections occur as sporadic cases or clusters of cases, and are associated with tick bites or occupational contact with blood or secretions from infected animals. CCHF outbreaks occur infrequently, but may be associated with changes in agricultural land use that increase tick contact or incursions of susceptible populations into areas where the disease is endemic. CCHF also can be transmitted in the health care setting through contact with blood or body fluids.

Short-Term and Long-term Health Risk: Low to moderate risk year round. FHP measures that include treating uniforms with permethrin, wear of DEET on skin, and proper uniform wear as directed by local Preventive Medicine personnel reduce the risk.

Water Contact Diseases

Operations or activities that involve extensive water contact may result in personnel being temporarily debilitated with leptospirosis in some locations. Leptospirosis risk typically increases during flooding. In addition, bodies of surface water are likely to be contaminated with human and animal waste. Activities such as wading or swimming may result in exposures to enteric diseases such as diarrhea and hepatitis via incidental ingestion of water. Prolonged water contact also may lead to the development of a variety of potentially debilitating skin conditions such as bacterial or fungal dermatitis.

Short-Term and Long-Term Health Risk: Moderate risk year round. Enforcement of FHP measures that include restriction of contact with surface water will eliminate the risk.

Respiratory Diseases

Deployed U.S. forces may be exposed to a wide variety of common respiratory infections in the local population including influenza, pertussis, viral upper respiratory infections, viral and bacterial pneumonia, tuberculosis, and others. U.S. military populations living in close-quarter conditions are at risk for substantial person-to-person spread of respiratory pathogens. Influenza is of particular concern

because of its ability to debilitate large numbers of unvaccinated personnel for several days. Prolonged contact with the local population may result in conversion rates to tuberculosis skin testing (PPD screening) that may be elevated over the U.S. military baseline.

Short-Term and Long-Term Health Risk: Low to moderate risk. Many viral respiratory infections are self-limiting. Bacterial infections such tuberculosis, meningococcal meningitis and bacterial pneumonias require medical intervention. Tuberculosis infection is chronic and requires treatment to prevent and/or treat active disease. Force Health Protection measures that include minimizing close contact with local population, avoiding over-crowding in billeting quarters, and personal hygiene to include covering coughs and hand washing will reduce risk. Additionally, USAF personnel complete a TB Risk Assessment upon redeployment to determine the likelihood they could have been exposed to tuberculosis while deployed and whether post-deployment testing is required.

Animal- Contact Diseases

Q Fever: Incubation period is 14-21 days. Q fever is a very common disease worldwide, but it is rarely diagnosed or reported, particularly in developing countries. It causes asymptomatic infections in livestock and other animals in a global distribution. Direct contact with infected animals or exposure to environments such as barnyards or fields that are contaminated with fluids from infected animals can result in human infection. Exposure occurs primarily via the respiratory route, with an infectious dose as low as a single organism. Infective aerosols also may be associated with contaminated materials such as straw, hay, or wool. Most human infections are asymptomatic or result in mild cases; the disease is usually unrecognized and unreported. In areas where Q fever is highly endemic among animal populations, human outbreaks of febrile flu-like illness may occur, sometimes with only indirect animal contact via aerosols. Aerosols can be carried downwind for long distances and cause human infection miles from the contaminated source. Less frequently, humans become infected through consumption of contaminated milk products.

Rabies: Incubation 21 to 56 days (maximum range: 9 to 180 days). NCMI assesses rabies is under good control. No human or animal cases have been officially reported to the OIE or the WHO since at least 1996. Qatar has not reported the number of dogs vaccinated since 2004 and has not reported the number of humans receiving post-exposure prophylaxis since 1995. The lack of reported human cases probably represents true disease absence; there is less certainty regarding the status of the animal population. Animal cases occur in Saudi Arabia, and infected animals likely move across the border into Qatar.

Short-Term and Long-Term Health Risk: Low to moderate risk year round. Enforcement of CENTCOM MOD 10 which prohibits contact with animals and requires reporting all animal bite and non-bite exposures will reduce risk.

6. VENEMOUS ANIMAL/INSECT

Snakes, scorpions, and spiders

Snakes

Cerastes gasperettii (Gasperetti's horned desert viper) - Found mainly in deserts w/rock outcroppings & fine sand, often in very arid places; however, may be found near oases. Mainly nocturnal & terrestrial (semi-fossorial). Can make itself almost invisible by wriggling down into loose sand. Often hides in rodent burrows & under stones. When aggitated, rubs inflated loops of its body together to make a "rasping hiss." Can strike quickly if disturbed. Venom primarily hemotoxic. Local symptoms may include pain, edema, redness; may have hematoma at site of bite & regional lymphadenopathy. No human fatalities reported (at least not documented), so far. No known antivenom currently produced.

Echis colorata (Burton's carpet viper) - Can exist in extreme desert conditions, often in dry rocky wadis, but prefers firm, rocky ground & usually avoids loose sand. Found from sea level up to 2,500 m elevation. Several widely disjunct populations, but mainly limited to eastern Egypt, Sinai peninsula, Israel, Jordan & southeastern Arabian peninsula, possibly also in southwestern Qatar. Mainly terrestrial, nocturnal in hot weather; may be active at dusk, may be diurnal in cool weather. Often most active after rains or on humid nights. Often basks during early morning in bushes >2 m above ground. Basks in the

open when cooler. When alarmed, throws body into C-shaped coils & rubs scales together making violent rustling sounds. Important cause of snakebite accidents & fatalities throughout its range; venom highly toxic to man. Venom primarily hemotoxic; internal & external hemorrhages common. Envenomation usually causes pain & swelling at bite site.

Hydrophis spiralis (Sea snake) - Found mainly in deep to moderately deep, yet relatively near-shore, coastal marine waters throughout the Persian Gulf & much of the northern Indian Ocean, then eastward to Indonesia & the Philippines. Both diurnal & nocturnal, preys mainly on eels & other elongate fish along bottom of partly or completely sandy or silted seabeds or shallow reefs, commonly inhabits bottom zones at depths below 10 m. Contains very potent neurotoxins & myotoxins. Larger than most other sea snakes, & has relatively longer fangs & greater supply of venom. Untreated envenomation likely to be fatal. This species causes many human deaths every year (mainly fishermen or divers). One of the most aggressive sea snakes, reportedly bites w/ little provocation.

Scorpions

Androctonus quinquestriatus (The death stalker) - Medium-sized scorpion. Mainly found in dry habitats (deserts) on various substrate surfaces but not in loose-sand dunes, & not common near towns, nor near (nor in) houses. Often hide in small natural crevices, burrows, under stones, etc. Widely distributed across northern & central Africa & the Middle East. Mainly nocturnal. Very potent neurotoxin, one of the world's most dangerous scorpions (partly because stings usually occur at locations very remote from necessary supportive medical care). Causes mainly localized reactions, swelling & pain in >90% of stings, but kills several humans annually. Children most severely affected because severity of venom effects are weight-dependent.

Scorpio maurus (Large-clawed scorpion) - Mainly found in deserts or semi-arid sites, but can also be found in dry (or seasonally dry) forests. Only found where some loose substate (e.g., sandy soil, organic debris) allows it to burrow 20-70 cm deep, often under a larger rock. Terrestrial (but climbs), & mainly nocturnal. Hides in its burrow w/ a slightly enlarged terminal chamber during the day. Relatively mild neurotoxic venom, w/ cytotoxic & hemotoxic factors. Envenomation usually causes moderate to severe local pain, sometimes limited local swelling & redness, which usually resolves in less than 24 hrs. w/ only symptomatic treatment.

Fish

Pterois miles (Lionfish) - Usually slow-swimming predatory fish. Mainly neurotoxic & cytotoxic w/ strong cardiotoxic & possibly myotoxic factors, too. Envenomation (sting) usually causes intense local pain at wound site, often radiating from there; hypotension, vasodilation, cardiac rhythm changes, respiratory difficulty, & sometimes primary shock, cardiac or respiratory arrest, & death.

Synanceia trachynis (Stone fish) - Found mainly in moderately shallow (mainly marine, sometimes brackish) waters above coral reefs or in near-shore coastal shallows usually over at least partly sandy bottoms. Widespread along the coasts of nearly every country that borders the Indian & southwestern Pacific Oceans (not yet reported from some), mainly north of the Tropic of Capricorn & mainly south of the Tropic of Cancer. Very potent neurotoxin w/ cytotoxic & possibly hemolytic factors (some spp. also have hyaluronidase & pre-synaptic transmitter blockers). Venom of most spp. is unstable at pH <5.5 or >9.0, & at temperatures above 50 degrees C. Spines can usually penetrate sand shoes when the fish is stepped on (or gloves when handled). Numerous human envenomations & deaths have been documented

Short-Term and Long-Term health risk: Low. Awareness of areas of likely activity and avoidance of habitats will reduce risk.

Other: None Identified

7. HEAT/COLD STRESS

Heat

Summer: March through October generally produces temperatures from 75 °F to 125 °F (reported as high as 142 °F). Heat injuries do occur sporadically; personnel are continually educated on heat stress, water intake and work/rest cycles. Temperature extremes can increase the potential for heat related injuries, including dehydration, heat exhaustion, and heat stroke. Early symptoms can include mild irritation,

lethargy, and inability to concentrate. Measures are in place to mitigate more serious effects of this critical hazard. Winter: November through February generally produces temperatures from 55 °F to 95 °F.

Short- and Long-Term Health Risks: Low to high. High in unacclimatized personnel. Risk is reduced to Moderate and Low through FHP measures. Chronic health implications from heat injury are rare but can occur—especially from more serious heat injuries such as heat stroke

8. NOISE

Continuous: Flight line noise to work areas near the runway.

Power generation and flight operations taking place on Al Udeid create outdoor noise levels that occasionally fluctuate above the threshold level requiring single-level hearing protection (85 A-weighted decibels (dBA)). In addition, health effects of noise exposure as low as 80 dBA occurring the same time as exposures to certain chemicals (carbon monoxide, aircraft fuels, and industrial chemicals) can cause permanent hearing loss. For the majority of personnel on this site, noise levels above the hearing protection threshold are for short durations and average daily exposures are below levels requiring participation in a hearing conservation program.

Individuals working on or near the flight line there may be intermittent high level (>105 dBA) exposures, depending on sortie rates of fighter aircraft and takeoffs and landings of transport and other aircraft. Individuals working or living near the flight line may also be exposed to low level 'nuisance' noise (< 85 dBA). These continuous low level exposures may cause sleep loss, fatigue, increase stress levels and increased blood pressure. The health effects due to this 'nuisance' noise are undetermined at this time.

Short- Term Health Risks: Low for the majority of personnel on this site.

Long-Term Health Risks: Moderate for individuals working on or near the flight line without proper hearing protection.

Impulse:

Personnel at this site do not participate in convoy operations. Weapons firing is limited to mostly training. Exposure is intermittent; however exposures can be associated with temporary hearing loss and permanent hearing loss as well as other hearing or central nervous system disorders.
Short- and Long-Term Health Risks: Low.

9. OTHER UNIQUE OCCUPATIONAL HAZARDS: None Identified

Pesticides/Pest Control:

Much of the pest control at this site consists of trapping and small area treatment for ants, spiders, rodents, and beetles with baits, glue boxes, and pyrethroids. Larvicides (i.e., Agnique and/or Altosid Briquets) are used for mosquito larval control. Some limited area residual pest control is performed to control mosquitoes. Personnel may have been incidentally exposed to very low levels of pesticide during pest control operations.

Short- and Long-Term Health Risks: Low

Asbestos and Lead-Based Paint:

There is no evidence of lead-based paint or asbestos in any facilities used by US personnel.

Short- and Long-Term Health Risks: Low

Non-Ionizing Radiation

Lasers: Aircraft are equipped with 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. Aircrew personnel have ALEPs available and are required to be worn by AFCENT aircrews. All personnel lased are evaluated by a flight surgeon, and if necessary an optometrist

at Camp Arifjan. This is documented on the SF600 and placed in their medical record.
Radio Frequency (RF) Radiation: Aircraft emitters have administrative processes in place to reduce the potential for exposures. Ground-based emitters have been evaluated and have administrative controls in place that ensure personnel are not within the uncontrolled environment hazard distance. Operators of these systems are aware to notify Bioenvironmental Engineering for any potential exposure to RF radiation to be investigated and documented.

Short- and Long-Term Health Risks: Low

Ionizing Radiation

Medical and Dental radiography are utilized in the EMEDS Clinic. Radiology personnel are enrolled in the thermoluminescent dosimetry (TLD) program, with no exposures recorded in the last six quarters. Industrial radiography is utilized in Building 3937. Permitted radioactive materials and generally licensed devices are used in CBRNE detection equipment, moisture density gauges and targeting pods. Semi-annually radioactive material leak tests are conducted semi-annually and indicate no hazards.

Short- and Long-Term Health Risks: Low

Waste Sites/Waste Disposal:

Regulated hazardous medical waste (red-bagged) is being collected and incinerated on site. 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. Chemical latrines are pumped out by trucks and waste is disposed off base. No specific health risks associated with these waste management operations have been identified.

Short- and Long-Term Health Risks: Low

10. UNIQUE INCIDENTS/CONCERNS:

In Jul 2005, 30 soil samples were taken to assess potential risks to personnel assigned to disassemble sand bag bunkers. Analyses included metals/inorganics as well as organics. Risks are determined based on comparison to available MEGs. There were no contaminants were detected at levels greater than the 1-year negligible MEG. These samples are not representative of population exposure in space or time.

Short-Term Health Risks: Currently sampling data for soil is not evaluated in an acute risk assessment.

Long-Term Health Risks: No risk identified based on available sampling data. Confidence in this assessment is medium.