Military Deployment
Periodic Occupational and Environmental Monitoring Summary (POEMS):
Base Camp Fujairah, United Arab Emirates (UAE): January through December 2015

AUTHORITY: This Periodic Occupational and Environmental Monitoring Summary (POEMS) has been developed in accordance with Department of Defense (DOD) Instructions (DODI) 6490.03 and 6055.05, and Joint Staff memorandum MCM 0017-12, *See Section 11, References.*

PURPOSE: This POEMS documents the DOD assessment of occupational and environmental health (OEH) risk for Base Camp Fujairah, United Arab Emirates (UAE) in 2015. It presents a qualitative summary of health risks identified at this location and their potential medical implications. The report is based on the limited OEH monitoring data collected during September 2015. No additional OEH data exists for this location.

This assessment assumes that environmental sampling at Base Camp Fujairah was performed at representative exposure points selected to characterize health risks at the *population–level*. Due to the constrained timeframe for comprehensive OEH sampling, significant limitations were found in the monitoring data, which is reflected herein. The report is not representative of all the fluctuations in environmental quality, nor is it likely to have captured unique occurrences. While one might expect similar health risks pertaining to historic or future conditions to those described in corresponding POEMS from sites in the UAE/Arabian Peninsula, the health risk assessments are scoped by specific sampling timeframes, limiting the comparisons of the results, unless stated otherwise in the discussions.

The POEMS can inform healthcare providers and others of environmental conditions experienced by individuals deployed to Base Camp Fujairah during the period of this assessment; however, it does not represent an individual exposure profile. Individual exposures depend on many variables, including the duration, frequency, and location of the activities a person performs 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 potential OEH exposures while deployed should have exposure/treatment noted in their medical record on a Standard Form (SF) 600 (Chronological Record of Medical Care).

Health protective exposure assumptions are used in assessing all health risks. For example, individuals are assumed to be constantly exposed (24 hours/day, 7 days/week) to the environmental conditions measured. Small groups of personnel assigned to Base Camp Fujairah may be at greater risk than the general population due to operational requirements; these groups are identified when appropriate.

SITE DESCRIPTION: Base Camp Fujairah is located in the Port of Fujairah. The port is approximately 70 nautical miles northwest of the Straits of Hormuz. The base camp is split into two separate compounds located approximately 5 miles apart. One compound supports U.S. Navy patrol boat escort operations for U.S. vessels entering and leaving the port. Structures on this compound consist of several trailers used for office space. Patrol boat maintenance is performed at the second compound. This compound contains a permanent patrol boat maintenance facility that is under the control of the UAE military. Power for the compounds is supplied by a combination of tactical generators and the municipal power grid. Water for personal hygiene and cleaning is supplied from the City of Fujairah. Bottled water for drinking is supplied from Emirates Natural Drinking Water™, which is approved by U.S. Army Veterinary Corps personnel. Less than 100 personnel are stationed at Base Camp Fujairah with deployments lasting 6-7 months. U.S. Navy personnel assigned to the base camp work in the port approximately 12 hours per day and live in contracted quarters in the city of Fujairah during off duty hours.

CLIMATE: Fujairah weather is characterized as a hot desert climate. The summer season lasts from April to October with average temperatures climbing to 97°F or higher. June is the hottest month with an average high temperature of 102°F and low of 90°F. The winter season lasts from November to March with average temperatures below 80°F. The coldest days of the year occur in January when the average low is 63°F with a high of 75°F. Precipitation is most likely to occur in January and least likely to occur in May. The relative humidity typically ranges from 20% to 86% over the course of a year. The humidity is the lowest in May, at which time the relative humidity drops below 25%. Humidity is the highest during September, typically exceeding 83%. Average wind speeds over the course of the year vary from 0 miles per hour (mph) to 17 mph. Winds rarely exceed 27 mph. The highest wind speeds occur in May when the winds average 9 mph with daily maximum wind speeds around 17 mph. The lowest average wind speeds occur in September, at which time they average 5 mph. Daily maximum wind speeds rarely exceed 11 mph in September. The prevailing winds are from the east. These easterly winds off the Gulf of Oman bring Fujairah the most rainfall and the highest humidity within the UAE.

SUMMARY: Conditions that may pose a moderate or greater health risk are summarized in Table 1. Table 2 provides population-based risk estimates for identified OEH conditions at Base Camp Fujairah. As indicated in the detailed sections that follow Table 2, established controls that reduce health risk have been factored into this assessment. In some cases (e.g., ambient air) specific controls are noted, but not routinely available/feasible.

Table 1: Summary of Occupational and Environmental Conditions with Moderate or Greater Health Risk
Short-term health risks and medical implications:
Heat injury: The short-term health risk of heat injury for unacclimatized individuals (i.e., onsite less than 4 weeks) and those with underlying health conditions is **moderate**. For all other individuals, the risk is **low**.
Long-term health risks and medical implications:
Not evaluated; insufficient data exist upon which to evaluate long-term health risks associated with environmental stressors. **None identified** for endemic diseases.

Table 2: Population-Based Health Risk Estimates – Base Camp Fujairah, UAE[1,2]			
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: **Not evaluated**; no data exist upon which to base a health risk assessment.	Air-conditioned living and working spaces provided For those not working in air conditioned spaces, time outdoors is minimized and doors or tent flaps remain closed.	Short-term: **Not evaluated**; no data exist upon which to base a health risk assessment.
	Long-term: **No available health guidelines.**		Long-term: **No available health guidelines.**
Particulate matter less than 2.5 microns in diameter ($PM_{2.5}$) *(see paragraph 2.4)*	Short-term: **Low** for September 2015. Mild acute (short-term) health effects such as eye, nose, or throat irritation are likely in individuals who spent much of their time outdoors. Existing medical conditions (e.g., asthma or respiratory diseases) may be exacerbated.	Air-conditioned living and working spaces provided For those not working in air conditioned spaces, time outdoors is minimized and doors or tent flaps remain closed.	Short-term: **Low.**
	Long-term: **Not evaluated**; insufficient data exist upon which to base a health risk assessment.		Long-term: **Not evaluated**; insufficient data exist upon which to base a health risk assessment.
Airborne metals *(see paragraph 2.5)*	Short-term: **None identified** based on available data.	Air-conditioned living and working spaces provided For those not working in air conditioned spaces, time outdoors is minimized and keeping doors or tent flaps closed.	Short-term: **None identified**.
	Long-term: **Not evaluated**; insufficient data exist upon which to base a health risk assessment.		Long-term: **Not evaluated**; insufficient data exist upon which to base a health risk assessment.
Volatile organic compounds (VOCs) *(see paragraph 2.6)*	Short-Term **None identified**. All VOCs detected were below their respective short-term military exposure guidelines.	Living and working areas located away from roadways, runways and other fuel combustion sources when possible.	Short-term: **Low.**
	Long-term: **Not evaluated**; insufficient data exist upon which to base a health risk assessment.		Long-term: **Not evaluated**; insufficient data exist upon which to base a health risk assessment.
~~Semi-volatile organic~~ compounds *(see paragraph 2.7)*	Short-term: **Not evaluated**; insufficient data exist upon which to base a health risk assessment.	Locate living and working areas away from roadways, runways and other fuel combustion sources	Short-term: **None identified.**
	Long-term: **Not evaluated**; insufficient data exist upon which to base a health risk assessment.		Long-term: **Not evaluated**; insufficient data exist upon which to base a health risk assessment.

Table 2: Population-Based Health Risk Estimates – Base Camp Fujairah, UAE[1,2]			
Source of Identified Health Risk[3]	**Unmitigated Health Risk Estimate[4]**	**Control Measures Implemented[5]**	**Residual Health Risk Estimate[4]**
Diesel exhaust *(see paragraph 2.8)*	Short-term: **Not evaluated**; insufficient data exist upon which to base a health risk assessment.	Living and working areas located away from roadways, runways, and generators when possible.	Short-term: **Not evaluated**; insufficient data exist upon which to base a health risk assessment.
	Long-term: **Not evaluated**; insufficient data exist upon which to base a health risk assessment.		Long-term: **Not evaluated**; insufficient data exist upon which to base a health risk assessment.
Soil			
Soil exposures *(see paragraph 3)*	Short-term: **Not evaluated**. Short-term soil exposures do not typically pose a health risk. Consequently, no exposure guidelines exist.	Keep sleeves rolled down to limit skin contact. Wash hands frequently especially before eating. Shower after soil exposure to remove soil from skin.	Short-term: **Not evaluated**; no data exist upon which to base a health risk assessment.
	Long-term: **Not evaluated**; no data exist upon which to base a health risk assessment.		Long-term: **Not evaluated**; no data exist upon which to base a health risk assessment.
Water			
Water used for other purposes *(See paragraph 4.2)*	Short-term: **Not evaluated**; no data exist upon which to base a health risk assessment.	Water provided by the local municipality is treated by reverse osmosis.	Short-term: **Not evaluated**; no data exist upon which to base a health risk assessment.
	Long-term: **Not evaluated**; no data exist upon which to base a health risk assessment.		Long-term: **Not evaluated**; no data exist upon which to base a health risk assessment.
Consumed water ~~(water used for~~ drinking) *(See paragraph 4.3)*	Short-term: **Not evaluated**; no data exist upon which to base a health risk assessment.	Bottled water is procured from a U.S. Army Veterinary Corps approved source.	Short-term: **Not evaluated**; no data exist upon which to base a health risk assessment.
	Long-term: **Not evaluated**; no data exist upon which to base a health risk assessment.		Long-term: **Not evaluated**; no data exist upon which to base a health risk assessment.

Table 2: Population-Based Health Risk Estimates – Base Camp Fujairah, UAE[1,2]			
Source of Identified Health Risk[3]	**Unmitigated Health Risk Estimate[4]**	**Control Measures Implemented[5]**	**Residual Health Risk Estimate[4]**
Endemic Disease			
~~Gastrointestinal~~ diseases *(See paragraph 6.2)*	Short-term: **Low**. Viral gastroenteritis can present at any time due to a high rate of personnel turnover, shared dining, berthing, bathroom facilities, and working spaces.	Standard Preventive Medicine measures: immunizations (hepatitis A and typhoid fever).	Short-term: **Low**. Based on disease incident reporting from Base Camp Fujairah, bacterial, protozoal, and hepatitis E infections present a low risk.
	Long-term: **Low**. Most gastrointestinal diseases do not cause prolonged illness.		Long-term: **Low** based on disease incident reporting from Base Camp Fujairah.
Arthropod vector-borne diseases *(See paragraph 6.3)*	Short-term: **Low**. Vectors present in the UAE (mosquitoes and sand flies) are capable of transmitting dengue fever, malaria, leishmaniasis, sand-fly fever, and West Nile Fever. Malaria transmission has not been reported in the UAE since 1998 but imported cases in immigrants and expatriates occur. Risk of Malaria associated with imported cases is **low** in the UAE.	Standard preventive medicine measures: Properly wear insecticide-treated uniforms and apply insect repellent to the skin, chemoprophylaxis in accordance with combatant command (CCMD) policy (e.g., malaria), and remove vector harborages within the camp.	Short-term: **Low** based on disease incident reporting from Base Camp Fujairah.
	Long-term: **Low**. It is possible to be infected during deployment with leishmaniasis and not have clinically evident disease until redeployed.		Long-term: **Low** based on disease incident reporting from Base Camp Fujairah.
Water contact diseases *(See paragraph 6.4)*	Short-term: **Low**. Flooding after heavy rainfall facilitates the spread of leptospirosis already present in the soil.	Avoid fresh water sources, such as puddles/standing water, drainage areas, etc.	Short-term: **Low** based on disease incident reporting.
	Long-term: **Low** based on disease incident reporting.		Long-term: **Low** based on disease incident reporting.
Respiratory diseases *(See paragraph 6.5)*	Short-term: **Moderate** for upper respiratory infections such as influenza. The high rate of personnel turnover, shared dining, berthing, recreational facilities, and working spaces allow for easy transmission. **Low** for tuberculosis and Middle East Respiratory Syndrome.	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.
	Long-term: **Low**. Most respiratory diseases do not cause prolonged illness.		Long-term: **Low** based on disease incident reporting from Base Camp Fujairah.

Table 2: Population-Based Health Risk Estimates – Base Camp Fujairah, UAE[1,2]			
Source of Identified Health Risk[3]	**Unmitigated Health Risk Estimate[4]**	**Control Measures Implemented[5]**	**Residual Health Risk Estimate[4]**
Animal contact diseases *(See paragraph 6.6)*	Short-term: **Low**. Exposures to animals and/or locations where animals are kept (barnyards, slaughterhouses) are the primary infection sources for anthrax, Q-fever, and rabies.	Standard preventive medicine measures, as well as CCMD 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: **Low** based on disease incident reporting from Base Camp Fujairah.
	Long-term: **Low** based on disease incident reporting from Base Camp Fujairah.		Long-term: **Low** based on disease incident reporting from Base Camp Fujairah.
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) to potentially lethal (e.g., Horned Viper).	Standard preventive medicine measures, such as reducing 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.**
	Long-term: **None identified**.		Long-term: **None identified.**
Heat/Cold Stress			
Heat *(See paragraph 8)*	Short-term: **Moderate** risk of heat injury in summer months for unacclimated personnel.	Adequate periods of acclimation for newly reporting personnel. Work-rest cycles are adjusted based on climatic conditions.	Short-term: **Low.**
	Long-term: **Low.**		Long-term: **Low.**
Noise *(See paragraph 9)*	Short-term: **Low**.	Hearing protection is readily available and used.	Short-Term: **Low.**
	Long-term: **Moderate** for both occupational noise and environmental noise exposures		Long-term: **Low** for occupational noise; **moderate** for environmental noise

Table 2: Population-Based Health Risk Estimates – Base Camp Fujairah, UAE[1,2]

Footnotes:

[1] Table 2 provides a qualitative estimate of population-based short- and long-term health risks associated with the occupational environment conditions at Base Camp Fujairah. 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, such as at the burn pit, 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 September 2015. No other environmental sampling data exist for this location. 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] Table 2 is organized by major categories of identified sources of health risk. It only lists those sub-categories specifically identified and addressed at Base Camp Fujairah. 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 Navy and Marine Corps Public Health Center (NMCPHC). When no risks of specific acute or chronic health effects were determined, sources were excluded. 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 Table 2 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.

1 Discussion of Health Risks at Base Camp Fujairah, UAE, by Source

The following sections provide additional information about the OEH conditions summarized above. All risk assessments were performed using the methodology described in the U.S. Army Public Health Command Technical Guide 230, *Environmental Health Risk Assessment and Chemical Exposure Guidelines for Deployed Military Personnel* (USAPHC TG230). 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 having preventive measures in place. For environmental exposures related to airborne dust, there are limited preventive measures available, and those that are have little efficacy in reducing exposure to ambient conditions.

2 Air

2.1 Site-Specific Sources Identified

The combination of multiple air pollution sources, climatic conditions, and topographic features contribute to air quality degradation at Base Camp Fujairah.

- Fujairah's hot, dry climate results in very dusty conditions during much of the year. During the summer months, low pressure systems that develop over Saudi Arabia create strong north-westerly winds known as Shamal. The Shamal stirs up the desert sands, reducing visibility and occasionally creating sandstorms that last for days. Dust storms, although infrequent, occasionally occur during the winter months.
- Gulf Petrochem operates a petrochemical refinery and storage facility in the port. It is equipped with at least 70 above ground storage tanks with a cumulative storage capacity of approximately 108 million gallons of crude oil and refined petroleum products. The port also operates 2 petroleum product transfer terminals capable of handling a total capacity of 8 ships.
- Volpak-Horizon operates a petroleum storage and transfer facility 1.2 miles north of the Gulf Petrochem Refinery. The facility owns 68 above ground storage tanks with a cumulative storage capacity of more than 550 million gallons of refined petroleum products. It also has 6 berths and 1 point buoy for petroleum product transfer to/from ships.

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, generators, construction activities, fires, and natural windblown dust. PM may 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, PM of health concern is divided into two fractions: PM_{10} and $PM_{2.5}$. PM_{10} includes coarse particles with a diameter of 10 micrometers or less (0.0004 inches or one-seventh the width of a human hair). $PM_{2.5}$ includes fine particles less than 2.5 micron, 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

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 and not available.

2.3.2 Sample Data/Notes

No PM_{10} sampling data exist for Base Camp Fujairah.

2.3.3 Short-term (Acute) Health Risk

Not evaluated; insufficient data exist upon which to base a health risk assessment.

2.3.4 Long-term (Chronic) Health Risk

Health Guidelines Not Defined for PM_{10}. The U.S. Environmental Protection Agency (EPA) has retracted its long-term standard (National Ambient Air Quality Standards [NAAQS]) for PM_{10} due to an inability to clearly link chronic health effects with PM_{10} exposures.
Return to Table 2

2.4 Particulate Matter, less than 2.5 microns

2.4.1 Exposure Guidelines

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

- Negligible MEG = 0.065
- Marginal MEG = 0.250
- Critical MEG = 0.500

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

- Negligible MEG = 0.015
- Marginal MEG = 0.065.

2.4.2 Sample Data/Notes

Nine $PM_{2.5}$ valid samples were taken at Base Camp Fujairah in September 2015. No additional $PM_{2.5}$ sampling data exists for the base camp. None of the samples exceeded the 1 year Negligible MEG for $PM_{2.5}$.

2.4.3 Short-term (Acute) Health Risk

Approach: To assess acute risk associated with $PM_{2.5}$ during September 2015, the peak concentrations of $PM_{2.5}$ from September were used. The concentrations detected during September 2015 ranged from 0.0385 mg/m^3 to 0.0568 mg/m^3. Health risk associated with the highest peak concentration is calculated first. If the health risk associated with that concentration is low, no further calculations are done, as the acute risk for all periods is low. If the highest peak concentration yielded a risk of moderate or greater, additional calculations are repeated on the next highest peaks until the risk characterization changed (e.g., the risk estimate changed from moderate to low).

Risk Assessment: **None identified** based on available data.

Medical Implications: None identified.

Confidence in the Risk Assessment: Although sampling locations were representative of population

exposure points, no $PM_{2.5}$ data exists for Base Camp Fujairah prior to or after September 2015. Thus, the confidence in this risk assessment is low.

2.4.4 Long-term (Chronic) Health Risk

Not evaluated; insufficient data exist upon which to base a health risk assessment.
Return to Table 2

2.5 Airborne Metals

2.5.1 Sample Data/Notes

Metals analysis was performed on the nine ambient air $PM_{2.5}$ samples collected at Base Camp Fujairah in September 2015.

2.5.2 Short-term (Acute) Health Risk

Approach: For screening purposes, all airborne metals detected from particulate matter sampling were compared to their corresponding 1 year Negligible MEGs. Metals without a single detection above that MEG were removed from further consideration. None of the metals detected from particulate matter sampling exceeded their respective 1 year Negligible MEGs.

Risk Approach: Airborne metals are **not a source of acute health risk** based on available data.

Medical Implications: None identified.

Confidence in the Risk Assessment: Based on the limited data available, confidence in this risk assessment is low.

2.5.3 Long-term (Chronic) Health Risk

Not evaluated; insufficient data exist upon which to base a health risk assessment.
Return to Table 2

2.6 Volatile Organic Compounds

Volatile organic compounds (VOCs) are carbon-based chemicals that easily evaporate under normal atmospheric conditions. They can be naturally occurring or man-made. Man-made VOCs are emitted by a wide array of products that number in the thousands. Examples include paints and lacquers, paint strippers, industrial solvents, household cleaners, pesticides, building materials and furnishings, fuels and fuel combustion, and cigarette smoke. Most of the VOCs detected at Base Camp Fujairah are associated with fuels and/or fuel combustion.

There are several sources of ambient VOCs at Base Camp Fujairah, including motor vehicles, electric power generation by commercial generators, offsite oil refining, petroleum storage, shore to ship transfer of refined petroleum products and routine maintenance operations on U.S. Navy maritime patrol craft.

2.6.1 Sample Data/Notes

Nine air samples were collected for VOC analysis in September 2015. No additional air sampling data exist prior to or after September 2015.

2.6.2 Short-term (Acute) Health Risk

Approach: For screening purposes, all compounds detected were first compared to their corresponding 1 year Negligible MEGs. Compounds without a single detection above that MEG were removed from further consideration. Only acrolein was present at concentrations above its 1 year Negligible MEG value of 0.00014 mg/m^3. Acrolein was detected at concentrations greater than its 1 year Negligible MEG in one of nine samples taken in September 2015. Concentrations of acrolein detected ranged from none detected to 0.0063 mg/m^3 with an average concentration of 0.0007 mg/m^3.

The peak concentration acrolein was used to assess the short-term health risk associated with potential exposures. Risk estimates for the highest peak were calculated first. As with other airborne compounds if the highest peak concentration yielded a risk estimate of low, no further calculations were deemed necessary.

Risk Assessment: Based on the available data, **no short-term health risk** associated with potential VOC exposures was identified.

Medical Implications: None Identified. Fuels and fuel combustion are the primary source of acrolein release to the atmosphere. Acrolein has a very disagreeable odor and breaks down rapidly in the air by reacting with other chemicals and sunlight. Most individuals can smell acrolein at a concentration of approximately 0.6 mg/m^3. Breathing small amounts of acrolein can cause watering of the eyes, burning of the nose and throat, and decreased breathing rate. These symptoms go away when exposure stops. Studies indicate that very slight eye irritation and annoyance/discomfort begin at about 0.2 mg/m^3, and nose/throat irritation and a decrease in respiratory rate at approximately 0.7 mg/m^3. Concentrations of acrolein detected at Base Camp Fujairah were well below the threshold concentrations known to cause irritation, thus no health effects associated with short-term acrolein exposure would be expected.

Confidence in the Risk Assessment: Confidence in this risk assessment is low. Only 9 VOC samples exist; all were obtained during a single sampling event in September 2015. Since existing data are not available to quantify the variability of VOC concentrations typically expected over a 12 month climatic cycle, the health risk may be under-stated.

2.6.3 Long-term (Chronic) Health Risk

Not evaluated; insufficient data exist upon which to base a health risk assessment.
Return to Table 2

2.7 Semi-Volatile Organic Compounds

Semi-volatile organic compounds (SVOCs) are compounds in ambient air formed during combustion; they are also present in the unburned portion of gasoline, diesel fuel, lubricating oils, wood, refuse, and other organic substances. Semi-volatile organic compounds include polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCBs), dioxin, and furans. They can be found in the air in minute concentrations everywhere, even the Antarctic. Semi-volatile organic compounds are present in air as vapors or adsorbed to the surface of small solid particles. Semi-volatile organic compounds in ambient air generally occur as complex mixtures rather than a single compound. There are several sources of SVOCs on and around Base Camp Fujairah, including electric power generators, motor vehicle exhaust, commercial shipping, host nation military vessels and U.S. Navy maritime patrol craft.

2.7.1 Sample Data/Notes

In September 2015, Navy Environmental and Preventive Medicine Unit No 2 employed a real-time photoelectric aerosol sensor capable of measuring total ambient particulate-bound PAH concentrations at Base Camp Fujairah. Six days of continuous sampling was completed from 14 through 19 September 2015. This yielded 706 data points at a single sampling location selected to be as representative as possible of where camp residents work and recreate. Concentrations of particle bound PAH compounds ranged from 0.0005 micrograms/cubic meter (µg/m^3) to 0.2142 µg/m^3 with an average concentration of 0.0277µg/m^3. No military exposure guidelines or EPA risk-based screening levels currently exist for inhalation of total PAH compounds. Accordingly, health risk values for benzo(a)pyrene (the PAH with the highest potential for health impacts) published by the California Air Resources Board were used for health risk screening purposes. The California Air Resources Board risk-based concentrations assume lifetime residential exposures (70 years) whereas exposures at Base

Camp Fujairah are typically 1 year or less. In addition, benzo(a)pyrene typically comprises less than 5 percent of the total amount of PAHs present in the atmosphere. To ensure a health protective assessment, however, all PAHs detected at the base camp were assumed to be benzo(a)pyrene. Total particle bound concentrations of PAH detected in the limited sampling data available were all well below this health protective screening value during the sampling period.

2.7.2 Short-term (Acute) Health Risk

Not evaluated; insufficient data exist upon which to base a health risk assessment.

2.7.3 Long-term (Chronic) Health Risk

Not evaluated; insufficient data exist upon which to base a health risk assessment.
Return to Table 2

2.8 Diesel Exhaust

Diesel exhaust is a complex mixture of gases, including oxides of nitrogen (NO and NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), carbon dioxide (CO_2), ozone, and diesel PM. Diesel PM consists of small solid particles formed by the incomplete burning of fuel in a diesel engine. Diesel PM is composed of a solid core of elemental carbon with other substances such as inorganic carbon, metals ash, sulfates, and silicates attached to the surface. The primary source of diesel exhaust at Base Camp Fujairah is from electricity generation by commercial and tactical generators. The gaseous components may also be generated by other combustion sources, including the commercial ship traffic, tactical vehicles and U.S. Navy maritime patrol craft.

2.8.1 Sample Data/Notes

Continuous sampling for CO, SO_2 and NO_2 was conducted on 17, 18 and 19 September 2015. The concentrations of the 3 gaseous components of diesel exhaust, for which a sampling method was available during the 3 days of sampling, were as follows; NO_2, none detected; SO_2, none detected and CO, none detected to 1.2 mg/m^3. All concentrations detected were less than their respective 1 year Negligible MEG during the sampling period.

2.8.2 Short-term (Acute) Risk

Not evaluated; insufficient data exist upon which to base a health risk assessment.

2.8.3 Long-term (Chronic) Health Risk

Not evaluated; insufficient data exist upon which to base a health risk assessment.
Return to Table 2

3 Soil

3.1 Surface Soil

3.1.2 Sample Data/Notes

No surface soil sampling data exist for Base Camp Fujairah.

3.1.3 Short-term (Acute) Health Risk

Not evaluated. Exposure to soils does not generally pose short-term health risk. Consequently, no MEGs for short-term exposure to soils exist, and sampling data for soils are not evaluated for acute health risks**.**

3.1.4 Long-term (Chronic) Health Risk

Not evaluated; no data exist upon which to base a health risk assessment.
Return to Table 2

4 Water

4.1 Site-Specific Sources Identified

Two sources of water are available at Base Fujairah; bottled water from U.S. Army Veterinary Corps approved commercial vendors and municipal water from the Fujairah City. Bottled water is supplied for drinking and the municipal water is used for all other purposes (e.g., cooking and personal hygiene).

4.2 Water for Other Purposes (Municipal Water)

4.2.1 Sample Data/Notes

Enhanced water surveillance, which includes chemical analysis, typically occurs at 6 month intervals during military operations. No sampling data exists for municipal water supplied to Base Camp Fujairah.

4.2.2 Short-term (Acute) Risk

Not evaluated; no data exist upon which to base a health risk assessment.

4.2.3 Long-term (Chronic) Health Risk

Not evaluated; no data exist upon which to base a health risk assessment.
Return to Table 2

4.3 Consumed Water (Bottled Water)

4.3.1 Sample Data/Notes

Bottled drinking water has been purchased for consumption at Base Camp Fujairah from suppliers approved by the U.S. Army Veterinary Corps since the camp was first occupied. Only 1 sample exists for bottled water consumed at Base Camp Fujairah, which was submitted in September 2015. None of the analytes detected in the sample for Base Camp Fujairah exceeded its respective MEG screening value.

4.3.2 Short-term (Acute) Risk

Not evaluated; insufficient data upon which to base a health risk assessment.

4.3.3 Long-term (Chronic) Health Risk

Not evaluated; insufficient data upon which to base a health risk assessment.
Return to Table 2

5 Military Unique

5.1 Chemical, Biological, Radiological, Nuclear (CBRN) Weapons

There were no specific hazard sources or exposure incidents documented in the Defense Occupational and Environmental Health Readiness System (DOEHRS) or the Military Exposure Surveillance Library (MESL) during the period of January 2015 to December 2015.

5.1.1 Short-term (Acute) and Long-term (Chronic) Health Risks

Not evaluated. No data were available upon which to base a health risk assessment.

5.2 Depleted Uranium

There were no specific hazard sources or exposure incidents documented in DOEHRS or MESL during the period of January 2015 to December 2015.

5.2.1 Short-term (Acute) and Long-term (Chronic) Health Risks

Not evaluated. No data were available upon which to base a health risk assessment.

5.3 Ionizing Radiation

No specific hazard sources or exposure incidents are documented in DOEHRS or MESL from January 2015 through December 2015.

5.3.1 Short-term (Acute) and Long-term (Chronic) Health Risks

Not evaluated. No data were available upon which to base a health risk assessment.

5.4 Non-Ionizing Radiation

There were no specific hazard sources or exposure incidents are documented in DOEHRS or MESL during the period of January 2015 to December 2015.

5.4.1 Short-term (Acute) and Long-term (Chronic) Health Risks

Not evaluated. No data were available upon which to base a health risk assessment.

6 Endemic Diseases

6.1 Sample Data/Notes

Assessed risk is 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 Disease Reporting System internet (DRSi) collects and maintains archives of Medical Event Reports (MERs) for all Services.
- Endemic diseases present in the UAE were identified using the “Destinations” section of the Centers for Disease Control and Prevention (CDC) Travelers’ Health website, **http://wwwnc.cdc.gov/travel/destinations/clinician/none/united-arab-emirates**.

- Additional health information was identified based on the World Health Organization (WHO) UAE Country Profile **http://www.who.int/gho/countries/are/en/**.
- 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.
- Actual disease prevalence in the local population is unknown due to lack of access to surveillance data in the host nation.
- Overall, few disease reports associated with Base Camp Fujairah were identified. Those disease reports that were associated with exposure at Base Camp Fujairah or reported by any UAE command were for routinely identified diseases that do not have ongoing or severe outcomes.

6.2 Gastrointestinal Diseases

Typhoid fever and Hepatitis A may pose a risk to travelers in the UAE, especially those visiting smaller cities or rural areas. U.S. Service members are routinely vaccinated against these diseases. 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, shared dining halls, berthing spaces, bathing facilities, and working spaces.

6.2.1 Short-term (Acute) Health Risks

Approach: The health risk for fomite-borne gastrointestinal infections and endemic food and waterborne diseases to individuals deployed to Base Camp Fujairah during the period of this assessment was epidemiologically assessed based on identifying endemic diseases, knowledge of preventive measures in place, reviewing the incidence of gastrointestinal diseases in the host nation and associated with deployment to Base Camp Fujairah, and directly communicating with military public health personnel.

Risk Assessment:

- The short-term risk for viral gastroenteritis is **low**. Risk due to a high rate of personnel turnover, shared dining halls, berthing spaces, bathing facilities, and working spaces, which are not substantially different than those found in similar settings within the United States.
- The short-term risk associated with food borne and waterborne diseases (i.e., bacterial or viral gastroenteritis, protozoal diarrhea, cholera, brucellosis, hepatitis E) at Base Camp Fujairah is **low**.

Medical Implications: Gastroenteritis, particularly from viral agents, can cause periodic outbreaks despite 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 medium. Food and waterborne 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 (chronic) Health Risks

Approach: Application of the same approach referenced in Section 6.2.1 above.

Risk Assessment: The long-term risk associated with food and waterborne diseases is **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 is high.
Return to Table 2

6.3 Arthropod Vector-Borne Diseases

The climate and ecological habitat found in the UAE support populations of arthropod vectors, including mosquitoes and sand flies capable of transmitting dengue fever, malaria, leishmaniasis, sand-fly fever, and West Nile Fever. Significant reduction in arthropod vectors because of malaria prevention efforts has dramatically reduced arthropod borne disease transmission in the local population. Malaria transmission has not been reported in the UAE since 1998, but the occurrence imported cases in immigrants and expatriates exist. Risk of dengue fever is higher in urban and other densely populated areas. Removing vector harborages and spraying for vectors within Base Camp Fujairah, as well as properly wearing insecticide treated uniforms and applying insect repellent to the skin, are the main protective measures against vector-borne diseases.

6.3.1 Short-term (Acute) Health Risks

Approach: The health risk for endemic vector-borne diseases to individuals deployed to Base Camp Fujairah during the period of this assessment was epidemiologically assessed based on identifying endemic diseases, knowledge of preventive measures in place, reviewing the incidence of vector-borne diseases in the host nation and associated with deployment to Base Camp Fujairah, and directly communicating with military public health personnel.

Risk Assessment: The short-term risk for the vector-borne diseases dengue fever, malaria, leishmaniasis (both visceral and cutaneous), sand-fly fever, and West Nile fever is **low**. Individuals who forward deploy from Base Camp Fujairah to outlying areas may experience increased short-term risk.

Medical Implications: Dengue fever, malaria, cutaneous leishmaniasis, sand-fly fever, and West Nile fever have short incubation periods ranging from days to weeks. Any of these diseases would initially present as acute fever and malaise, which may be accompanied by a rash, and would lead to acute, sometimes severe illness.

Confidence in the Risk Assessment: Confidence in the risk assessment is high. WHO health statistics indicate low incidence of vector-borne disease in the local UAE population; no vector-borne disease reports for individuals who resided within Base Camp Fujairah were identified.

6.3.2 Long-term (Chronic) Health Risks

Approach: Application of the same approach referenced in Section 6.3.1 above.

Risk Assessment: The long-term risk for leishmaniasis is **low**.

Medical Implications: Both visceral and cutaneous leishmaniasis may have extended incubation periods, ranging from a week to years. Although rare, it is possible to be infected during deployment and not have clinically evident disease until redeployment. Leishmaniasis should be considered in the differential diagnosis for any unusual skin lesions or chronic, systemic disease.

Certain vector-borne diseases have the potential to cause long-term health effects; individual history of infection with a vector-borne disease should be considered when evaluating patients with chronic symptoms such as prolonged fatigue, depression, arthralgia or myalgia.

Confidence in the Risk Assessment: Confidence in the risk assessment is high. Incidence of leishmaniasis, particularly visceral, in the post-deployment military population is known to be extremely low.
Return to Table 2

6.4 Water Contact Diseases

Operations or activities that involve extensive freshwater contact may result in exposure to leptospirosis. The occurrence of flooding after heavy rainfall enables the spread of leptospirosis; as water saturates the environment, *Leptospira* bacteria present in the soil pass directly into surface waters. Activities such as wading or swimming in freshwater sources may result in exposures to enteric diseases such as diarrhea and hepatitis via incidental ingestion of water. Prolonged freshwater contact may lead to the development of a variety of skin conditions, such as bacterial or fungal dermatitis. Elimination of standing and/or open bodies of freshwater protects against the spread of water contact diseases.

6.4.1 Short-term (Acute) Health Risks

Approach: The health risk for endemic water contact diseases to U.S. Service members deployed to Base Camp Fujairah during the period of this assessment was epidemiologically assessed based on identifying endemic diseases, knowledge of preventive measures in place, reviewing the incidence of water contact diseases in the host nation and associated with deployment to Base Camp Fujairah, and directly communicating with military public health personnel.

Risk Assessment: The short-term risk for leptospirosis is **low**.

Medical Implications: Leptospirosis, which has an incubation period of 5–14 days, presents as acute fever with nonspecific symptoms that last for a few days to 3 weeks or longer.

Confidence in the Risk Assessment: Confidence in the risk assessment is high. No reported cases of water contact diseases were identified during the assessment period.

6.4.2 Long-term (Chronic) Health Risks

Approach: Application of the same approach referenced in Section 6.4.1 above.

Risk Assessment: **No long-term risk** for leptospirosis was identified.

Medical Implications: None identified.

Confidence in the Risk Assessment: Confidence in risk assessment is high.
Return to Table 2

6.5 Respiratory Diseases

U.S. military populations living and working in close-quarter conditions are at risk for substantial person-to-person spread of upper respiratory infections, such as the common cold and influenza. Primary exposure pathways for tuberculosis are 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.

6.5.1 Short-term (Acute) Health Risks

Approach: The health risk for respiratory diseases to individuals deployed to Base Camp Fujairah during the period of this assessment was epidemiologically assessed based on identifying endemic diseases, knowledge of preventive measures in place, reviewing the incidence of MERs in the host nation and associated with deployment to Base Camp Fujairah, and directly communicating with military public health personnel.

Risk Assessment:

- The short-term risk for upper respiratory infections is **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 is **low**.
- The short-term risk for MERS is **low**.

Medical Implications:

- Upper respiratory infections, particularly from viral agents, can cause periodic outbreaks despite preventive measures. A small proportion of infections may require greater than 72 hours convalescence and/or hospitalization
- **Tuberculosis**: Symptoms of tuberculosis, including fever, weight loss, night sweats and cough, typically start within 1-6 months of infection. The lifetime risk for tuberculosis disease after becoming infected is 5-10%; half of this risk occurs in the first two years following infection.
- **MERS**: MERS is a viral respiratory illness first reported in Saudi Arabia in 2012. Symptoms of MERS include fever, cough, and shortness of breath. The incubation period is typically 2-14 day.

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. WHO health statistics indicate low incidence of tuberculosis in the local UAE population; no reports of tuberculosis were identified for individuals at Base Camp Fujairah during the assessment period.

6.5.2 Long-term (Chronic) Health Risks

Approach: Application of the same approach referenced in Section 6.5.1 above.

Risk Assessment: The long-term risk for tuberculosis and MERS is **low**.

Medical Implications:

- **Tuberculosis**: Symptoms of tuberculosis can be delayed by 2 or more years following infection. Tuberculosis should be considered in assessing symptoms of fever accompanied by night sweats and cough.

- **MERS**: MERS should be included in the differential diagnosis for any patient with a history of travel from countries in or near the Arabian Peninsula within 14 days before symptom onset, or close contact with a symptomatic traveler who developed fever and acute respiratory illness (not necessarily pneumonia) within 14 days after traveling from countries in or near the Arabian Peninsula.

Confidence in the Risk Assessment: Confidence in risk assessment is high. WHO health statistics indicate low incidence of tuberculosis in the local UAE population; prevalence of tuberculosis in the post deployment military population is known to be extremely low.
Return to Table 2

6.6 Animal-Contact Diseases

The UAE requires all domesticated cats and dogs to be vaccinated against rabies; however, animal rabies still occurs in wild animal populations with foxes and sporadically in stray dogs. No recently reported cases of rabies occurring in humans identified. Anthrax, while not prevalent, has been reported in domestic animals in some parts of the UAE. Q-fever was found in a rare species of Gazelle (in a private collection in Dubai as late as 2007) and reported in racing camels in Abu Dhabi. Serologic evidence suggests the presence of Q-fever in humans throughout the Arabian Peninsula.

6.6.1 Short-term (Acute) Health Risks

Approach: The health risk for endemic animal contact diseases to individuals deployed to Base Camp Fujairah 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 Base Camp Fujairah, and direct communication with military public health personnel.

Risk Assessment: The short-term risk for rabies, Q-fever and anthrax is **low**.

Medical Implications:

- **Rabies**: All unprovoked dog or wild animal bites should be medically evaluated for possible post-exposure rabies treatment.
- **Q-fever**: Acute Q fever is usually a nonspecific febrile illness, often with atypical pneumonia or transient hepatitis. Sero-conversion without symptoms is common. As a rule, Q-fever is self-limiting and resolves without treatment, but some untreated cases may progress to chronic Q-fever (e.g., endocarditis, granulomatous hepatitis, osteomyelitis, interstitial pulmonary fibrosis).

Confidence in the Risk Assessment: Confidence in risk assessment is high. No reports of any animal contact diseases were identified during the risk assessment period.

6.6.2 Long-term (chronic) health risks:

Approach: Application of the same approach referenced in Section 6.6.1 above.

Risk Assessment: The long-term risk for rabies, Q-fever and anthrax is **low**.

Medical Implications: None identified.

Confidence in the Risk Assessment: Confidence in risk assessment is high. While actual disease prevalence in the local animal population is unknown, the incidence of animal contact diseases in the post-deployment military population is known to be extremely low.
Return to Table 2

7 Venomous Animals/Insects

The species listed below have home ranges that overlap the location of Base Camp Fujairah, and may present a health risk if they are encountered.

7.1 Short-term (Acute) Health Risk

Approach: The following information was obtained from Clinical Toxinology Resources via **http://www.toxinology.com/index.cfm**. The search consisted of looking for animals and/or insects present in the UAE and/or specifically in Fujairah. The following list should not be considered inclusive; other venomous scorpions and snakes may be present in the region. See Section 10 for more information about pesticides and pest control measures.

Risk Assessment:

- Spiders: There are no venomous spiders native to the UAE, however, it has been reported that Red-back spiders (*Latrodectus hasselti*) have been imported from Australia. The bite of the Red-back Spider can cause serious illness and has even caused deaths. Red-back Spiders rarely leave their webs; therefore, humans are not likely to be bitten unless a body part such as a hand is put directly into the web. Due to the nature of their small jaws, many bites are ineffective. In the event of a successful bite, the venom acts directly on the nerves, resulting in release and subsequent depletion of neurotransmitters. Common early symptoms are pain (which can become severe), sweating (to include local sweating at bite site), muscular weakness, nausea and vomiting. The health risk associated with spiders is **low**.
- Scorpions: Numerous species of scorpion including, *Androctonus crassicauda, Hemisscorpius arabicus* and *Hottentotta jayakari* are found in the UAE. Of these, only the sting of *Androctonus crassicauda*, the Black Scorpion, have the potential to be clinical significant. UAE native scorpion stings commonly cause short-lived local effects, such as pain at the sting location, in normally healthy adults. The health risk associated with scorpions is **low**.
- Terrestrial Snakes: Numerous venomous terrestrial snake species are found in the UAE. The following species are known to be present and could pose a health risk if encountered:

Cerastes cerastes	Horned Viper
Echis omanensis	Oman Saw-scaled Viper
Pseudocerastes persicus	Persian Horned Viper
Cerastes gasperettii	Gasperetti's Horned Viper
Echis sochureki	Sochurek's Saw-scaled Viper
Walterinnesia morgani	Black Desert Cobra

  Bites associated with all these species are severe, with both local tissue damage and paralysis. The health risk associated with the bite of these snakes is high, but potential for encounters is low. Overall, the health risk associated with terrestrial snakes is **low**.
- Sea Snakes: Venomous sea snakes are plentiful in the waters of the Arabian Gulf. The following list of sea snake species are known to be present and could pose a health risk, if encountered: *Hydrophis cyanocinctus, Pelamus platurus, Astrotia stokesii, Enhydrina schistose, Hydrophis gracilis, Hydrophis lapemoides Hydrophis ornatus, Hydrophis spiralis, Hydrophis viperina,* and

Lapemus curtus. Most sea snakes fear humans and flee when encountered. The health risk associated with sea snakes is **low**.

Medical Implications: None identified.

Confidence in the Risk Assessment: Confidence in risk assessment is high.

7.2 Long-term (Chronic) Health Risk

Approach: Application of the same approach referenced in Section 7.2 above.

Risk Assessment: The chronic health risk associated with venomous animals and insects is **low**.

Medical Implications: None identified.

Confidence in the Risk Assessment: Confidence in risk assessment is high.
Return to Table 2

8 Heat/Cold Stress

8.1 Site-Specific Conditions

Fujairah weather is characterized by a tropical desert climate with hot, sunny conditions. During the summer season (April to October) daytime temperatures average 97°F or higher and during the winter season (November to March) daytime temperatures average approximately 80°F. Fujairah experiences the highest humidity within the UAE because of easterly winds off the Gulf of Oman. Humidity is highest during late summer (August and September). This seasonally high humidity makes the effective temperature more oppressive and potentially dangerous from a heat stress perspective.

8.2 Heat

8.2.1 Heat Exposure Guidelines

In accordance with military doctrine, heat advisory conditions are typically communicated to the camp population by displaying color-coded flags based on Wet Bulb Globe Temperature (WBGT) measurements. WBGT measurements are a composite temperature used to estimate the effect of temperature, humidity, wind speed, and solar radiation on individuals. The WBGT reading drives preventive measures, such as adjusting work/rest cycles and limiting outdoor activities, to reduce the risk of heat injury. The range of WBGT measurements and their corresponding color-coded flags are, as follows:

- Less than 80 White
- 80 – 84.9 Green
- 85 – 87.9 Yellow (Amber)
- 88 – 89.9 Red
- 90 or above Black

8.2.2 Sample Data/Notes

No information on heat stress control program at Base Camp Fujairah exist.

8.2.3 Short-term (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 DOEHRS or MESL for Base Camp Fujairah. Risk estimates are based strictly on climatologic data.

Risk Assessment:

- The short-term health risk of heat injury for unacclimatized individuals (i.e., on site less than 4 weeks) and those with underlying health conditions is **moderate**. For all other individuals, the risk is **low**.

- The long-term health risk is l**ow**.

Medical Implications: Severity of heat illness 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 with 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 military heat stress prevention programs, the confidence in risk assessment is high. Individuals who experienced mild symptoms of heat illness may not have sought medical attention; this may lead to an underestimation of the risk.
Return to Table 1
Return to Table 2

8.3 Cold

8.3.1 Short (Acute) and Long-term (Chronic) Health Risk

Approach: No cold casualty, medical event reports involving cold injuries or cold stress monitoring data were available in the DOEHRS or MESL for Base Camp Fujairah. Risk estimates are based strictly on climatologic data.

Risk Assessment: **None identified** due to Fujairah's climate comprised of a very hot summer and a relatively warm winter.

Medical Implications: None identified.

Confidence in the Risk Assessment: Based on available information on climatic conditions, the confidence in risk assessment is high.

9 Noise

9.1 Continuous

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) focused on occupational noise exposures and the prevention of noise-induced hearing loss. These standards may be adjusted for longer work shifts, up

to a maximum of 16 hours (see table below). A minimum 8 hour recovery time is required between shifts.

8 Hour	12 Hour	16 Hour
85	82.375	82

9.1.2 Site-Specific Conditions

Sources of potential noise include individual commercial and tactical generators, motor vehicles and hand tools used when performing routine maintenance operations of patrol craft. The standard work shift at Base Camp Fujairah is 8 to12 hours, after which personnel return to their contracted living quarters within Fujairah City. Thus, there is a full recovery period for Base Camp Fujairah personnel after noise exposure.

9.1.3 Sample Data/Notes

No occupational noise exposure data exists for Base Camp Fujairah.

9.1.4 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 Assessment:

- The short-term risk of noise induced hearing loss with the use of appropriate hearing protection use was **low**. 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.

- The long-term risk of noise induced hearing loss with appropriate hearing protection use is **low**.

Confidence in the Risk Assessment: Confidence in the health risk assessment is low. The Services have well-established hearing conservation programs and hearing protection is readily available and generally worn by individuals in occupations with known occupational noise exposures. However, the limited availability of information about specific noise sources and enforcement of the use of personal protective equipment diminishes confidence.
Return to Table 2

9.2 Impulse

9.2.1 Short-term (Acute) and Long-term (Chronic) Health Risks

Approach: No information about potential sources of impulse noise (140 dbA or greater) is available for Base Camp Fujairah.

Risk Assessment:

- Short-term health risk: Not evaluated; insufficient data exist upon which to base a health risk assessment.
- Long-term health risk: Not evaluated; insufficient data exist upon which to base a health risk assessment.

10 Unique Concerns

10.1 Asbestos and Lead-Based Paint

10.1.1 Site Specific Conditions

No data on asbestos containing material or peeling lead-based paint are available for Base Camp Fujairah.

10.1.2 Short-term (Acute) and Long-term (Chronic) Health Risk

Approach: No data on asbestos and lead-based paint available.

Risk Assessment:

- Short-term health risk: **Not evaluated**; insufficient data exist upon which to base a health risk assessment.
- Long-term health risk: **Not evaluated**; insufficient data exist upon which to base a health risk assessment.

10.2 Potential Environmental Contamination Sources

In addition to environmental exposures already discussed, there may be specific occupational exposure pathways associated with vehicle, aircraft, patrol craft and site maintenance. Typical chemicals of concern associated with potential occupational exposures are petroleum, oils, and lubricants. Occupational exposures to these stressors are generally well characterized in garrison and there are procedures in place for storing, handling, using and disposing hazardous materials which generally minimize health risk.

10.2.2 Short-term (Acute) and Long-term (Chronic) Health Risks

Approach: Review of existing industrial hygiene data for Camp Base Fujairah.

Risk Assessment:

- Short-term health risk: **Not evaluated**; insufficient data exist upon which to base a health risk assessment.
- Long-term health risk: **Not evaluated**; insufficient data exist upon which to base a health risk assessment.

10.3 Pesticides/Pest Control

10.3.1 Site Specific Conditions

No information is available concerning pest control services available at Base Camp Fujairah.

10.3.2 Short-term (Acute) and Long-term (Chronic) Health Risks

Risk Assessment:

- Short-term health risk: **Not evaluated**; no information exists upon which to base a health risk assessment

- Long-term health risk: **Not evaluated**; no information exists upon which to base a health risk assessment

11 References

POEMS developed according to:

1. **DODI 6490.03, *Deployment Health*, September 2011.**
2. **MCM 0017-12, *Procedures for Deployment Health Surveillance,* December 2012.**
3. **DODI 6055.05, Occupational and Environmental Health, November 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, Base Camp Fujairah, September 2014.**
6. **Occupational and Environmental Health Site Assessment, Base Camp Fujairah, September 2015.**
7. **United Arab Emirates Post Report – eDiplomat – Area, Geography, and Climate Updated http://www.ediplomat.com/np/post_reports/pr_ae.htm, August 12, 2003.**

Sampling data were obtained from the:

8. **Defense Occupational and Environmental Health Readiness System at https://doehrs-ih.csd.disa.mil/Doehrs/.**

Additional environmental health reports/survey documents are from the:

9. **Military Exposure Surveillance Library: https://mesl.apgea.army.mil/mesl**
10. **Department of Veterans Affairs-Environmental Letter – Burn Pits Throughout Iraq, Afghanistan, and Djibouti, April 26, 2010.**

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

11. **USAPHC Technical Guide (TG230): Environmental Health Risk Assessment and Chemical Exposure Guidelines for Deployed Military Personnel, December, 2013 Revision.**
12. **USACHPPM, Particulate Matter Factsheet No. 64-009-0708, 2008.**
13. **National Academy of Sciences, Committee on Toxicology: Acute Exposure Guideline Levels for Selected Airborne Chemicals, Volume 8 (2010).**

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

14. **Centers for Disease Control and Prevention (CDC) Travelers' Health website (http://wwwnc.cdc.gov/travel/destinations/uae.htm), "Destinations" section, United Arab Emirates.**
15. **World Health Organization Country Profiles/United Arab Emirates (http://www.who.int/countries/are/en/)**
16. **Clinical Toxinology Resources, University of Adelaide, Australia; http://www.toxinology.com/index.cfm.**
17. **Wildlife Middle East News, Volume 2, Issue 3, December 2007.**

NOTE. The DOEHRS-EH database was queried to obtain the available sample data for air, soil, and drinking and nondrinking water sources at Base Camp Fujairah, UAE. The data are currently assessed using the TG230 December 2013 Revision as described above contains, 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) that are compared to MEGs derived for similar exposure durations. If exposure point concentrations are less than or equal to Negligible MEGs, the risk is low. If

levels are higher than the respective Negligible MEG, then a chemical-specific toxicity and exposure evaluation is completed by appropriate subject matter experts, which includes comparison to any available marginal, critical, or catastrophic MEGs. For drinking water, 15-L/day MEGs are used for screening while site specific 5–15L/day are used for more detailed assessment. For nondrinking water (such as that used for personal hygiene or cooking) the "consumption rate" is limited to 2-L/day (similar to the USEPA regulatory limits), 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.

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 DOD Force Health Protection and Readiness.

Army Public Health Center Phone: (800) 222-9698. **http://phc.amedd.army.mil/**

Navy and Marine Corps Public Health Center (NMCPHC) Phone: (757) 953-0700. **http://www-nmcphc.med.navy.mil/**

U.S. Air Force School of Aerospace Medicine (USAFSAM) 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. **https://health.mil/Military-Health-Topics/Health-Readiness**