Military Deployment
Periodic Occupational and Environmental Monitoring Summary (POEMS): Contingency Operating Base (COB) Speicher (Al Sahra Airfield, Camp Sycamore), Iraq: 2003 to Close (10/20/2011)

AUTHORITY: This periodic occupational and environmental monitoring summary (POEMS) has been developed in accordance with Department of Defense (DoD) Instructions 6490.03, 6055.05, and JCSM (MCM) 0028-07, *See REFERENCES.*

NOTE: This POEMS is an update of the COB Speicher POEMS dated 03 February 2012. It extends the coverage dates from 2003-2010 to 2003 through the closure date of 10/20/2011. Six additional ambient air volatile organic compounds samples were collected during the time between December 2010 and October 2011 and no occupational/environmental health hazards have been identified from these samples or any additional sources.

PURPOSE: This POEMS documents the Department of Defense (DOD) assessment of base camp level occupational and environmental health (OEH) exposure data for COB Speicher, Iraq (and the associated aliases/locations—Al Sahra Airfield and Camp Sycamore). It presents the identified health risks and associated medical implications. These findings are based on information collected from May 2003 through October 2011, including 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 are limited to the time period(s) and area(s) sampled and thus may not reflect fluctuations or unique occurrences. It also may not fully represent 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 DESCRIPTIONS: COB Speicher was a contingency operating base and airfield controlled by U.S. Forces. COB Speicher was called Al Sahra Airfield until its capture from the Iraqi Army during the 2003 invasion of Iraq. COB Speicher was located near Tikrit in northern Iraq, approximately 170 kilometers north of Baghdad and 11 kilometers west of the Tigris River. Two main runways serve the airfield at COB Speicher. COB Speicher was transferred to the Government of Iraq on 20 October 2011. Agricultural land surrounds COB Speicher on three sides and residential areas are located outside of the base on the northeastern side of the COB. No industrial activities are within sight of the camp. This POEMS also addresses Camp Sycamore due to its collocation with COB Speicher.

SUMMARY: Below are the health risks estimated to present a moderate or greater risk of medical concern and appropriate recommended follow-on medical actions, if any. The Table on the following page provides a list of all identified health risks at these locations. As indicated in the detailed Sections that follow the Table, 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 not routinely available/feasible.

Short-term health risks and medical implications: The following may have caused acute health effects in some personnel *during deployment at COB Speicher (and the associated locations)*:

Inhalable coarse particulate matter less than 10 micrometers in diameter (PM_{10}); food/waterborne diseases (e.g., bacterial diarrhea, Hepatitis A, Typhoid fever, Brucellosis, diarrhea-cholera, diarrhea-protozoal); other endemic diseases (cutaneous leishmaniasis, Crimean-Congo hemorrhagic fever, Sandfly fever, Tuberculosis (TB), Leptospirosis, Schistosomiasis, Rabies, Q fever); and heat stress. For food/waterborne diseases (e.g., bacterial diarrhea, Hepatitis A, Typhoid fever, Brucellosis, diarrhea-cholera, diarrhea-protozoal), if ingesting food and water off post, the health effects can temporarily incapacitate personnel (diarrhea) or result in prolonged illness (Hepatitis A, Typhoid fever, and Brucellosis). For heat stress, risk can be greater for susceptible persons including those older than 45, of low fitness level, unacclimatized personnel, or individuals with underlying medical conditions. Risks from food/waterborne diseases and heat stress may have been reduced with preventive medicine controls and mitigation, which includes Hepatitis A and Typhoid fever vaccinations, and only drinking from approved water sources in accordance with standing CENTCOM policy. For other vector-borne endemic diseases (cutaneous leishmaniasis, Crimean-Congo hemorrhagic fever, Sandfly fever), these diseases may constitute a significant risk due to exposure to biting vectors; risk is reduced to low by proper wear of treated uniform, application of repellent to exposed skin, and appropriate chemoprophylaxis. For water contact diseases (Leptospirosis, Schistosomiasis) activities involving extensive contact with surface water increase risk. For respiratory diseases (Tuberculosis (TB)), personnel in close-quarter conditions could have been at risk for person-to-person spread. Animal contact diseases (Rabies, Q fever), pose year-round risk. Air quality: Although the overall risk is low for exposure to burn pit emissions, exposures may result in mild to more serious short-term health effects (e.g., eye, nose or throat and lung irritation) in some personnel while at this site. 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 short-term health effects. Although most effects from exposure to particulate matter and to burn pit emissions 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 COB Speicher (and the associated locations). 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*).

Long-term health risks & medical implications:

The hazards associated with potential long-term health effects at COB Speicher (and the associated locations) include inhalable coarse particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$) and Leishmaniasis-visceral infection. Leishmaniasis is transmitted by sand flies. Visceral leishmaniasis (a more latent form of the disease) causes a severe febrile illness, which typically requires hospitalization with convalescence over 7 days. The leishmaniasis parasites may survive for years in infected individuals. Consequently, this infection may go unrecognized until infections become symptomatic years later. Air Quality: It is considered possible that some otherwise healthy personnel who were exposed for a long-term period to particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$) could develop certain health conditions (e.g., reduced lung function, cardiopulmonary disease). Personnel with a history of asthma or cardiopulmonary disease could potentially be more likely to develop such chronic health conditions. While the PM exposures are documented and archived, at this time there are no specific recommended, post-deployment medical surveillance evaluations or treatments. Providers should still consider overall individual health status (e.g., any underlying conditions/susceptibilities) and any potential unique individual exposures (such as burn pits, or occupational or specific personal dosimeter data) when assessing individual concerns. Certain individuals may need to be followed/evaluated for specific occupational exposures/injuries (e.g., annual audiograms as part of the medical surveillance for those enrolled in the Hearing Conservation Program; and personnel covered by Respiratory Protection Program and/or Hazardous Waste/Emergency Responders Medical Surveillance).

Table. Population-Based Health Risk Estimates – [COB Speicher, Iraq] [1, 2]

Source of Identified Health Risk[3]	Unmitigated Health Risk Estimate[4]	Control Measures Implemented	Residual Health Risk Estimate[4]
AIR			
PM_{10}	Short-term: Variable (Low to High): Daily levels vary, acute health effects (e.g., upper respiratory tract irritation) more pronounced during peak days. More serious effects are possible in susceptible persons (e.g., those with asthma/existing respiratory diseases).	Limiting strenuous physical activities when air quality is especially poor; and actions such as closing tent flaps, windows, and doors.	Short-term: Variable (Low to High): Daily levels vary, acute health effects (e.g., upper respiratory tract irritation) more pronounced during peak days. More serious effects are possible in susceptible persons (e.g., those with asthma/existing respiratory diseases).
	Long-term: No health guidelines		Long-term: No health guidelines
$PM_{2.5}$	Short-term: Low: A majority of the time mild acute health effects are anticipated; certain peak levels may produce mild eye, nose, or throat irritation in a few personnel and pre-existing health conditions (e.g., asthma, or cardiopulmonary diseases) may be exacerbated.		Short-term: Low: A majority of the time mild acute health effects are anticipated; certain peak levels may produce mild eye, nose, or throat irritation in a few personnel and pre-existing health conditions (e.g., asthma, cardiopulmonary diseases) may be exacerbated.
	Long-term: Variable (Low to Moderate): A small percentage of persons may be at increased risk for developing chronic conditions (particularly those more susceptible to acute effects (e.g., those with asthma/existing respiratory diseases).		Long-term: Variable (Low to Moderate): A small percentage of persons may be at increased risk for developing chronic conditions (particularly those more susceptible to acute effects (e.g., those with asthma/existing respiratory diseases).
Metals	Low: Cadmium and Chromium (total)		Low: Aluminum, Cadmium, Cobalt, and Vanadium
WATER			
Water for Other Purposes (Personal Hygiene, Cooking, Showering, etc.)	Low. Short-term health effects are not expected	Approved sources.	No hazards identified.
Endemic Disease			
Food borne/Waterborne (e.g., diarrhea-bacteriological)	Short-term: Variable (None to High): High (bacterial diarrhea, Hepatitis A, Typhoid fever) to Moderate (diarrhea-cholera, diarrhea-protozoal, brucellosis) to Low (hepatitis E). If ingesting local food/water, the health effects can temporarily incapacitate personnel (diarrhea) or result in prolonged illness (Hepatitis A, Typhoid fever, Brucellosis, Hepatitis E).	Preventive measures include Hepatitis A and Typhoid fever vaccination and consumption of food and water only from approved sources.	Short-term: Low to none
	Long-term: none identified		Long-term: No data available
Arthropod Vector Borne	Short-term: Moderate: Leishmaniasis-cutaneous, Crimean-Congo hemorrhagic fever, and sandfly fever. Low: Rickettsioses, Typhus-fleaborne, and West Nile fever.	Preventive measures include proper wear of treated uniform, application of repellent to exposed skin and bed net use.	Short-term: Low
	Long-term: Moderate: Leishmaniasis-visceral infection		Long-term: Moderate

Water-Contact (e.g. wading, swimming)	Short-term: Moderate for leptospirosis and schistosomiasis.	Prohibiting recreational water activities and water contact avoidance	Short-term: Low for leptospirosis and schistosomiasis.
	Long-term: No data available		Long-term: No data available
Respiratory	Short-term: Low to Moderate: Moderate for tuberculosis (TB) to Low for meningococcal meningitis.	Providing adequate living and work space; medical screening; vaccination	Short-term: Low
	Long-term: No data available		Long-term: No data available
Animal Contact	Short-term: Low to Moderate: Moderate (Rabies and Q-fever), Low (Anthrax and H5N1 avian influenza)	Prohibiting contact with, adoption, or feeding of feral animals in accordance with (IAW) CENTCOM General Order 1B. Risks are further reduced in the event of assessed contact by prompt post-exposure rabies prophylaxis IAW the CDC's ACIP guidelines.	Short-term: No data available
	Long-term: Low (Rabies)		Long-term: No data available
VENOMOUS ANIMAL/ INSECTS			
Snakes, scorpions, and spiders	Short-term: Low: if encountered, effects of venom vary with species from mild localized swelling (e.g. *S. maurus*) to potentially lethal effects (e.g. *V. albicornuta*).	Risks reduced by avoiding contact, proper wear of uniform (especially footwear), and timely treatment	Short Term: Low: if encountered, effects of venom vary with species from mild localized swelling (e.g. *S. maurus*) to potentially lethal effects (e.g. *V. albicornuta*).
	Long-term: No data available		Long-term: No data available
HEAT/COLD STRESS			
Heat	Short-term: Low to Moderate	Work-rest cycles, proper hydration and nutrition, and WBGT monitoring.	Short-term: Low
	Long-term: Low		Long-term: Low
Cold	Long-term: Low risk of cold stress/injury.	Risks from cold stress reduced with protective measures such as use of the buddy system, proper wear of protective clothing, proper hydration and nutrition.	Long-term: Low risk of cold stress/injury.
	Long-term: Low		Long-term: Low.
Unique Incidents/ Concerns			
Waste Sites/Waste Disposal	Short-term: Low	Proper waste disposal practices	Short-term: Low
	Long-term: Low		Long-term: Low
Burn Pits	Short-term: Low: acute symptoms such as eye, nose, throat, and lung irritation from short-term exposure may occur. Burn pits closed in December 2010.	Control measures include locating burn pits downwind of prevailing winds, increased distance from troop populations when possible, and improved waste segregation and management techniques.	Short-term: Low
	Long-term: Low		Long-term: Low

[1] 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. It does not represent a unique individual exposure profile. 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.

[2] This assessment is based on available data and reports obtained from the May 2003-December 2010 timeframe. It is a historical representation of general site conditions but may not reflect certain fluctuations or unique exposure incidents. Acute health risk estimates are generally consistent with field-observed health effects.

[3] This Summary Table (and the following discussions) is organized by major categories. It only lists those sub-categories specifically identified and addressed. 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 the probability that the exposure would produce such health effects. 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 are discussed in the following sections.

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

1 Discussion of Health Risks at COB Speicher by Source

The major source categories of potential health risk evaluated at COB Speicher are described below. 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 are below screening levels). While this discusses sub-categories that have been determined to present no identifiable health risk, the Summary Table only contains those sub-categories that were determined to pose some level of potential health risk.

For Operation Iraqi Freedom/New Dawn, COB Speicher was a contingency operating base and airfield controlled by U.S. Forces. COB Speicher was called Al Sahra Airfield until its capture from the Iraqi Army during the 2003 invasion of Iraq. COB Speicher was located near Tikrit in northern Iraq, approximately 170 kilometers north of Baghdad and 11 kilometers west of the Tigris River. Two main runways serve the airfield at COB Speicher. Agricultural land surrounds COB Speicher on three sides and residential areas are located outside of the base on the northeastern side of the COB. This POEMS also addresses Camp Sycamore due to its collocation with COB Speicher.

2 Air

2.1 Site-Specific Sources Identified

Personnel deployed to COB Speicher (and the associated camps) are exposed to various airborne contaminants. Windblown dust and sand contribute to particulate matter (PM) exposures at COB Speicher (and the associated camps). There are no major industrial facilities/activities within one kilometer of the COB. A sub-surface petroleum, oil, and lubricants pipeline is located near the western perimeter boundary. The major contributors to air contamination are the operation of an airfield and typical military operations, including vehicular traffic, generators and other local sources (including burning of waste) that contribute to the ambient environment at this location.

Deployment environmental health surveillance sampling for particulate matter less than 10 micrometers in aerodynamic diameter (PM_{10}) occurred in 2003, 2004, 2005, 2006, 2007, 2008, and 2009 and the data set was limited to data collected by the U.S. only. All other years have no samples with which to characterize that particular year. Environmental surveillance for particulate matter less than 2.5 micrometers in aerodynamic diameter ($PM_{2.5}$) occurred in 2006, 2008, 2009, and 2010 and the data set was limited to data collected by the U.S. only. All other years have no samples with which to characterize that particular year. Environmental health surveillance for organic chemical pollutants occurred in 2004, 2007, 2008, and 2009 and the data set was limited to data collected by the U.S. only. All other years have no samples with which to characterize that particular year. The summary of results follows.

2.2 PM_{10}.

2.2.1 Sample data/Notes:

Exposure Guidelines (in micrograms per cubic meter, $\mu g/m^3$):
Short Term PM_{10}: Negligible Military Exposure Guideline (MEG)=250, Marginal MEG=420, Critical MEG=600.

Long-term PM_{10} MEG: Not Available.

The range of 24-hour PM_{10} concentrations in 181 samples that were collected from May 2003 to October 2009 was 15 to 946 µg/m^3. The average was 205 µg/m^3.

2.2.2 Short-term health risk:

Variable (Low to High). Short-term risk is based on comparison of daily concentrations to the 24-hour MEGs. The variable risk is due to significant fluctuation in daily concentrations. Risk from peak exposures was High in 2003, 2005, 2006, and 2008. Risk from typical exposures was Low in 2003, 2005, 2006, and 2008. All other years had insufficient data available with which to determine risk. Daily PM_{10} levels exceeded no Negligible, Marginal or Critical MEG indicating concentrations were not a hazard on 72 percent of the days sampled. Daily PM_{10} levels exceeded a Negligible, Marginal or Critical MEG resulting in Low risk on 17 percent of the days sampled, Moderate risk on 5 percent of the days sampled, and High risk on 6 percent of the days sampled. 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. Confidence in the risk estimate is moderate.

2.2.3 Long-term health risk:

Not Evaluated-no available health guidelines. The U.S. Environmental Protection Agency (EPA) has retracted its long-term standard National Ambient Air Quality Standard (NAAQS) for PM_{10} due to an inability to clearly link chronic health effects with chronic PM_{10} exposure levels.

2.3 $PM_{2.5}$

2.3.1 Sample data/Notes:

Exposure Guidelines:

Short-term (24-hour) $PM_{2.5}$ MEGs (µg/m^3): Negligible MEG=65, Marginal MEG=250, Critical MEG=500.

Long-term $PM_{2.5}$ MEGs: Negligible MEG=15, Marginal MEG=65.

The range of 24-hour $PM_{2.5}$ concentrations in 80 samples that were collected from March 2006 to August 2010 was 13 to 284 µg/m^3. The average was 73 µg/m^3.

2.3.2 Short-term health risk:

Low. Short-term risk is based on comparison of daily concentrations to 24-hour MEGs.

For all of the days sampled (100%), $PM_{2.5}$ concentrations were below the short-term Marginal MEG indicating Low risk in 2006, 2008, 2009, and 2010. All other years had no $PM_{2.5}$ data available. Daily $PM_{2.5}$ levels exceeded no Negligible, Marginal or Critical MEG indicating concentrations were not a hazard on 56 percent of the days sampled. Daily $PM_{2.5}$ levels exceeded a Negligible MEG resulting in Low risk on 43 percent of the days sampled, Moderate risk on 1 percent of the days sampled, and High risk on none of the days sampled. 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.

Pre-existing health conditions (e.g., asthma or cardiovascular diseases) may have been exacerbated. Confidence in the risk estimate is low due to limited field data.

2.3.3 Long-term health risk:

Variable (Low to Moderate). Long-term risk is based on comparison of the average sample concentration to the long-term MEGs. Unlike PM_{10}, chronic $PM_{2.5}$ exposures are potentially associated with some long-term health consequences. The average $PM_{2.5}$ concentration was 64 µg/m^3 for samples collected in 2006, average $PM_{2.5}$ concentration was 79 µg/m^3 for samples collected in 2008, 59 µg/m^3 for samples collected in 2009, and 87 µg/m^3 for samples collected in 2010. These are above the negligible long-term MEG of 15 µg/m^3 or the marginal long-term MEG of 65 µg/m^3. Risk was Moderate in 2008 and 2010 and Low in 2006 and 2009. All other years had no $PM_{2.5}$ data available. With repeated exposures 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. Confidence in risk estimate is low due to limitations in field data and health effects data.

2.4 Metals

2.4.1 Sample data/Notes:

The degree of risk is estimated based on comparison of metals results from PM_{10} air samples to specified MEGs. One hundred ninety samples were collected in May 2003 through October 2009. During the pre-screen, seven analyzed metals (aluminum, barium, cadmium, chromium (total), cobalt, manganese, and vanadium) in the samples were found at concentrations above a long-term MEG and were evaluated further for acute and chronic hazards. None of the other metals analyzed had concentrations above short term or long term MEGs.

The maximum concentration of aluminum was above its 1-year negligible MEG but below 14 day negligible MEG (342 µg/m^3). When compared to its long term MEG, the average concentration for aluminum in 2006 (9.3 µg/m^3) was above the respective 1 year negligible MEG. The average concentrations for aluminum for all other years sampled were below the respective 1 year negligible MEG. In 2004, 2007, and 2010 an insufficient number of samples was available to characterize risk.

The maximum concentration of barium was above its 1-year negligible MEG but below 14 day negligible MEG (171 µg/m^3). When compared to its long term MEG, the average concentration for barium was below the respective 1 year negligible MEG for all years sampled. In 2004, 2007, and 2010 an insufficient number of samples was available to characterize risk.

The maximum concentrations of cadmium in 2005 and 2008 were above its 1-year negligible MEG and its 14 day negligible MEG (0.021 µg/m^3). When compared to its long term MEG, the average concentration for cadmium in 2006 and 2008 (0.01 and 0.011 µg/m^3) was above the respective 1 year negligible MEG. The average concentrations for cadmium for all other years sampled were below the respective 1 year negligible MEG. In 2004, 2007, and 2010 an insufficient number of samples was available to characterize risk.

The maximum concentration of total chromium in 2005 was above its 1-year negligible MEG and its 14 day negligible MEG (3.42 µg/m^3). When compared to its long term MEG,

the average concentration for chromium was below the respective 1 year negligible MEG for all years sampled. . In 2004, 2007, and 2010 an insufficient number of samples was available to characterize risk.

The maximum concentration of cobalt was above its 1-year negligible MEG but below 14 day negligible MEG (4.9 µg/m^3). When compared to its long term MEG, the average concentration for cobalt in 2006 (0.000749 µg/m^3) was above the respective 1 year negligible MEG. The average concentrations for cobalt for all other years sampled were below the respective 1 year negligible MEG. In 2004, 2007 and 2010 an insufficient number of samples were available to characterize risk.

The maximum concentration of manganese was above its 1-year negligible MEG but below 14 day negligible MEG (3000 µg/m^3). When compared to its long term MEG, the average concentration for manganese was below the respective 1 year negligible MEG for all years sampled. In 2004, 2007, and 2010 an insufficient number of samples was available to characterize risk.

The maximum concentration of vanadium was above its 1-year negligible MEG but below its 14 day negligible MEG (75 µg/m^3). When compared to its long term MEG, the average concentration for vanadium in 2006 (0.41 µg/m^3) was above the respective 1 year negligible MEG. The average concentrations for cadmium for all other years sampled were below the respective 1 year negligible MEG or an insufficient number of samples was available to characterize risk. In 2004, 2007, and 2010 an insufficient number of samples was available to characterize risk.

2.4.2 Short-term health risk:

Low. All metals except for cadmium (in 2005 and 2008) and chromium (in 2005) were below their corresponding short-term MEG values. For cadmium, risk from peak exposures was Low in 2005 and 2008. Risk from typical exposures was Low in both 2005 and 2008. Cadmium was not a hazard in 2003, 2004, and 2009. All other years had insufficient data available with which to determine risk. For chromium, risk from peak and typical exposures was Low in 2005. Chromium was not a hazard in 2003, 2004, 2008, and 2009. All other years had insufficient data available with which to determine risk. Confidence in the risk estimate is medium.

2.4.3 Long-term health risk:

Low. All metals except for aluminum (in 2006), cadmium (in 2006 and 2008), cobalt (in 2006), and vanadium (in 2006) were below their corresponding long-term MEG values. Long-term risk was Low for aluminum in 2006, cadmium in 2006 and 2008, cobalt in 2006, and vanadium in 2006. Confidence in the risk estimate is medium.

2.5 Chemical Pollutants (gases and vapors)

2.5.1 Sample data/Notes:

Thirty-five ambient air volatile organic compounds pollutant samples were collected between September 2004 and May 2011. None of the analyzed organic chemical pollutants in the samples were found at concentrations above short- or long-term MEGs.

2.5.2 Short and long-term health risks:

None identified based on the available sampling data. Confidence in the risk estimate is low due to limited field data.

3 Soil

3.1 Sample data/Notes:

Seventy-seven soil samples were collected at COB Speicher (and the associated locations) between May 2003 and November 2009. Analytical data for these samples were assessed for the following groups: heavy metals, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polyaromatic hydrocarbons (PAHs), pesticides, herbicides and radionuclides. No contaminants were detected in the 77 samples that exceeded applicable 1-year Negligible MEGs.

3.2 Short-term health risks:

Currently, sampling data for soil are not evaluated to determine short-term risk.

3.3 Long-term health risks:

None identified based on available sampling data. All detected contaminants were below applicable 1-year negligible MEGs**.**

4 Water

In order to assess the risk to U.S. personnel from exposure to water in theater, U.S. Army Public Health Command (USAPHC) identified the most probable exposure pathways based on available information. At this time, the exposure pathways are defined as ingestion of drinking water and the use of water for non-drinking purposes (such as personal hygiene, food preparation, or incidental ingestion). A conservative (protective) assumption is that all personnel ingest 5-15 liters of water per day (L/day) for up to 365 days. Non-drinking water exposures are characterized by ingestion of much less than 5-15 liters of water per day (assumed range of military ingestion rates). Analytical data for all drinking and nondrinking water samples were assessed for the following groups: metals, SVOCs, VOCs, polychlorinated biphenyls (PCBs), herbicides, and ions. Note that gross alpha and gross beta radiological results are not included in the health risks.

4.1 Drinking Water.

The primary source of drinking water at COB Speicher (and the associated locations) was bottled water and Reverse Osmosis Water Purification Unit (ROWPU)-treated water supplied at COB Speicher (and the associated locations). Routine local field tests conducted by Preventive Medicine and Veterinary personnel and contractors include bacteriological and physical inspections. Drinking water samples used in this assessment include one bottled water sample received at USAPHC in 2007, one bottled water sample received in 2008, one ROWPU treated drinking water sample received in 2003, three ROWPU treated drinking water samples received in 2008, and five ROWPU treated drinking water samples received in 2009. The eleven drinking water samples were assessed to determine the short-term and long-term health risks. All other years have no samples with which to characterize that particular year. Confidence in the conclusions is low due to the limited data per year.

4.1.1 Short-term health risk:

None. After the pre-screen chloride, chromium, magnesium, and sulfate were retained as possible hazards because while no 1-year 15 L/day negligible MEGs were available for

these substances, water MEGs for other durations were available. Concentrations of chloride, chromium, magnesium, and sulfate did not exceed short-term MEGs and were not considered health hazards. No hazards were identified for any of the sampled years. Confidence in the risk estimate is low due to limited field data.

4.1.2 Long-term health risks:

None identified based on the available sampling data. Confidence in the risk estimate is low due to limited field data.

4.2 Water: Used for Other Purposes (Personal Hygiene, Cooking, Showering, etc.)

This type of exposure would include water from ROWPU produced water and raw well water that is used for non-drinking applications such as water used for personal hygiene, laundry, cooking and showering. Water samples representing non-drinking water were collected in 2004 (six samples), 2005 (ten samples), 2006 (eleven samples), 2007 (fourteen samples), 2008 (fifteen samples), and 2009 (sixteen samples). The non-drinking water samples were assessed to determine the short-term and long-term health risks. As a result, confidence in the conclusions is low due to the limited data.

4.2.1 Short-term health risk:

Low. After the pre-screen the only potential hazard identified was sulfate in 2004-2009. At both typical and peak exposures, personnel can be expected to have been occasionally exposed to concentrations that would result in a negligible severity for sulfate. This indicates a Low risk where few, if any, personnel are expected to have noticeable health effects during the mission from sulfate. This Low risk estimate is based on a low confidence level due to limited sampling data available. No short-term hazards were identified for any other of the sampled years. Confidence in the risk estimate is low due to limited field data.

4.2.2 Long-term health risks:

None identified based on the available sampling data. Confidence in the risk estimate is low due to limited field data.

5 Military Unique

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

No specific hazard sources were documented in the Military Environmental Surveillance Library (MESL).

5.2 Depleted Uranium (DU):

No specific hazard sources were documented in the MESL.

5.3 Ionizing Radiation:

No specific hazard sources were documented in the MESL.

5.4 Non-Ionizing Radiation:

No specific hazard sources at COB Speicher (and the associated locations) were documented in the MESL. However , many radio frequency radiating (RFR) sources were operated/maintained at the COB Speicher (and the associated locations), such as radars, vehicular radios, back pack radios, ground emplaced radios, avionics radios, wireless LAN, Satellite Communications Systems, Counter Remote Control Improvised Explosive Device Electronic Warfare Systems, and Cellular and Mobile Phones. Typically, RFR system operators and maintenance personnel are the only individuals potentially at risk from exposure to RFR that exceeds the standards. This risk is minimal if safety procedures documented in the system technical manuals are observed. The safety controls for these sources are typically addressed in the technical manuals specific to the particular system. Operator and maintenance personnel should be aware of safety precautions associated with their RFR sources. Observance of the safety precautions will preclude personnel from exposure to RFR that exceeds the Department of the Army and Department of Defense standards.

6 Endemic Disease[1]

This document lists the endemic disease reported in the region, its specific risks and severity and general health information about the disease. The general information on how meningococcal meningitis is transmitted from person to person came from the World Health Organization's (WHO) Fact Sheet No. 141 on Meningococcal Meningitis.

6.1 Foodborne and Waterborne Diseases

Food borne and waterborne diseases in the area are transmitted through the consumption of local food and water. Local unapproved food and water sources (including ice) can be heavily contaminated with pathogenic bacteria, parasites, and viruses to which most U.S. Service Members have little or no natural immunity. Disease surveillance has improved since OIF, but it remains rudimentary. Before OIF, only a small fraction of diseases were identified or reported. Diarrheal diseases can be expected to temporarily incapacitate a very high percentage of personnel within days if local food, water, or ice is consumed. Hepatitis A and typhoid fever can cause prolonged illness in a smaller percentage of unvaccinated personnel. In addition, although not specifically assessed in this document, significant outbreaks of viral gastroenteritis (e.g., norovirus) and food poisoning (e.g., *Bacillus cereus*, *Clostridium perfringens*, *Staphylococcus*) may occur.

6.1.1 Diarrheal diseases (bacteriological)

High, unmitigated; Low, mitigated: Unmitigated health risk to U.S. personnel was high year round. Mitigation strategies in place include consumption of approved food, water, and ice; handwashing; and applied food/water safety mechanisms. Diarrheal diseases (bacteriological) could be expected to temporarily incapacitate a very high percentage of

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

personnel (potentially over 50 percent per month) within days if local food, water, or ice was consumed. Field conditions (including lack of hand washing and primitive sanitation) may facilitate person-to-person spread and epidemics. Typically, these result in mild disease treated in outpatient setting; recovery and return to duty in less than 72 hours with appropriate therapy. A small proportion of infections may require greater than 72 hours limited duty, or hospitalization.

6.1.2 Hepatitis A, typhoid fever, and diarrhea-protozoal

High, unmitigated; Low, mitigated: Unmitigated health risk to U.S. personnel was high year round. Mitigation strategies in place include consumption of approved food, water, and ice; handwashing; and applied food/water safety mechanisms. Diarrheal diseases (bacteriological) could be expected to temporarily incapacitate a very high percentage of personnel (potentially over 50 percent per month) within days if local food, water, or ice was consumed. Field conditions (including lack of hand washing and primitive sanitation) may facilitate person-to-person spread and epidemics. Typically, these result in mild disease treated in outpatient setting; recovery and return to duty in less than 72 hours with appropriate therapy. A small proportion of infections may require greater than 72 hours limited duty, or hospitalization.

6.1.3 Short-term and Long-term Health Risks:

Short-term health risks: The overall short-term unmitigated health risk associated with other foodborne and waterborne diseases at COB Speicher and vicinity was considered high (for bacterial diarrhea, hepatitis A, typhoid fever), moderate (for diarrhea-protozoal, diarrhea-cholera, brucellosis), and low (Hepatitis E) if local food or water was consumed. Preventive Medicine measures such as vaccinations, consumption of approved food, water, and ice; and handwashing reduced the health risk to low to none. Confidence in the risk estimate was medium.

Long-term health risks: None identified based on available data. The confidence in the risk estimate is medium.

6.2 Arthropod Vector-Borne Diseases

During the warmer months (typically from April through November), the climate and ecological habitat support populations of arthropod vectors, including mosquitoes, ticks, and sandflies. Significant disease transmission is sustained countrywide, including urban areas. In addition, other vector-borne diseases are transmitted at low or unknown levels and may constitute a significant risk.

Through 2006, approximately 15-20 Center of Disease Control and Prevention mini-light traps were collected and observed several times per week during the trapping season of March-September. The traps were analyzed for the following species: *Aedes, Culex, Anopheles, Coquillettida*, and *Culiseta*. Records indicated that these species have not been identified as positive vectors for disease at Speicher.

6.2.1 Malaria

None: Indigenous transmission of malaria in Iraq was eliminated as of 2008 reducing risk among personnel exposed to mosquito bites to None.

6.2.2 Leishmaniasis

Moderate, unmitigated; Low, mitigated: Unmitigated health risk to U.S. personnel was moderate with seasonal transmission (April-November). Leishmaniasis-visceral is

transmitted by sandflies. Rare cases are possible among personnel exposed to sandfly bites in areas with infected humans, dogs, or other reservoir animals. Asymptomatic chronic infections may occur and may become symptomatic years later. When symptomatic, visceral leishmaniasis causes a severe febrile illness, which typically requires hospitalization with convalescence over 7 days. Mitigation strategies in place include IPM practices, permethrin treated uniforms, pesticides, reduction of pest/breeding habitats, and engineering controls.

6.2.3 Crimean-Congo hemorrhagic fever

***Moderate, unmitigated; Low, mitigated**:* Unmitigated health risk to U.S. personnel was moderate year round. Crimean-Congo hemorrhagic fever (CCHF) infections can occur as sporadic cases or clusters of cases, and are associated with tick bites or occupational contact with blood or secretions from infected animals. Outbreaks of CCHF occur infrequently. It is a very severe illness typically requiring intensive care with fatality rates from 5% to 50%. Mitigation strategies in place include IPM practices, permethrin treated uniforms, pesticides, reduction of pest/breeding habitats, and engineering controls.

6.2.4 Sandfly fever

Moderate, unmitigated; Low, mitigated: Unmitigated health risk to U.S. personnel was moderate with seasonal transmission (May-June and September-October). The disease is transmitted by sandflies, which typically bite at night and breed in dark places rich in organic matter, particularly in rodent or other animal burrows. Rare cases are possible. Abandoned dwellings, sometimes used by troops as temporary quarters, also can harbor significant numbers of sandflies. Although data are insufficient to assess potential disease rates, 1 to 10 percent of personnel could be affected per month under worst-case conditions with no mitigation measures in place. In small groups exposed to heavily infected sandfly populations in focal areas, attack rates can be very high (over 50 percent). Incidents can result in debilitating febrile illness typically requiring 1 to 7 days of supportive care followed by return to duty. Mitigation measures in place include IPM practices and permethrin treated uniforms. Mitigation strategies include proper wear of treated uniforms, application of repellent to exposed skin, and use of bed nets (when applicable). Additional measures used include the use of pesticides, reduction of pest/breeding habitats, and engineering controls.

6.2.5 Rickettsioses, tickborne

Low: Unmitigated health risk to U.S. personnel was low with seasonal transmission (April-November). Rare cases (less than 0.1% per month) of rickettsioses disease are possible among personnel exposed to tick bites. Rickettsioses are transmitted by multiple species of hard ticks, including Rhipicephalus spp., which are associated with dogs. Other species of ticks, including Ixodes are also capable of transmitting rickettsial pathogens in this group. In addition to dogs, various rodents and other animals also may serve as reservoirs. Ticks are most prevalent from April through November. Incidents can result in debilitating febrile illness, which may require 1 to 7 days of supportive care followed by return to duty. Mitigation measures in place include IPM practices and permethrin treated uniforms. Mitigation strategies include proper wear of treated uniforms, application of repellent to exposed skin, and use of bed nets (when applicable). Additional measures used include the use of pesticides, reduction of pest/breeding habitats, and engineering controls.

6.2.6 Typhus-fleaborne

Low: Unmitigated health risk to U.S. personnel was low year round. Typhus-murine is assessed as present, but at unknown levels. Rare cases are possible among personnel exposed to rodents (particularly rats) and flea bites. Incidents may result in debilitating febrile illness typically requiring 1 to 7 days of supportive care followed by return to duty. Mitigation measures in place include IPM practices and permethrin treated uniforms. Mitigation strategies include proper wear of treated uniforms, application of repellent to exposed skin, and use of bed nets (when applicable). Additional measures used include the use of pesticides, reduction of pest/breeding habitats, and engineering controls.

6.2.7 West Nile fever

Low: Unmitigated health risk to U.S. personnel was low with seasonal transmission (April-November). West Nile fever was present and maintained by the bird population and mosquitoes that help to transfer the diseases from birds to humans. The majority of infections in young, healthy adults are asymptomatic although it can result in fever, headache, tiredness, and body aches, occasionally with a skin rash (on the trunk of the body) and swollen lymph glands. West Nile fever is a febrile illness typically requiring 1-7 days of inpatient care followed by return to duty; convalescence may be prolonged. Mitigation strategies in place include IPM practices, permethrin treated uniforms, pesticides, reduction of pest/breeding habitats, and engineering controls.

6.2.8 Sindbis

Low: Unmitigated health risk to U.S. personnel was low with seasonal transmission (April-November). Sindbis and sindbis-like viruses are maintained in a bird-mosquito cycle in rural areas and occasionally caused limited outbreaks among humans. The viruses are transmitted by a variety of Culex mosquito species found primarily in rural areas. A variety of bird species may serve as reservoir or amplifying hosts. Extremely rare cases (less than 0.01% per month attack rate) could have occurred seasonally (April - November). Debilitating febrile illness often accompanied by rash, typically requires 1 to 7 days of supportive care; significant arthralgias may persist for several weeks or more in some cases. Mitigation measures in place include IPM practices and permethrin treated uniforms. Mitigation strategies include proper wear of treated uniforms, application of repellent to exposed skin, and use of bed nets (when applicable). Additional measures used include the use of pesticides, reduction of pest/breeding habitats, and engineering controls.

6.2.9 Overall Risk Levels

Moderate to Low, unmitigated; Low to None, mitigated: The overall short-term unmitigated health risk associated with arthropod vector-borne diseases at COB Speicher and vicinity was considered Moderate (for sandfly fever, leishmaniasis (cutaneous and visceral), and Crimean-Congo hemorrhagic fever) and Low (for rickettsioses, typhus-murine (fleaborne) West Nile fever, and sindbis). Preventive measures such as vaccinations, consumption of approved food, water, and ice; handwashing; and applied food/water safety reduced the health risk to low to none for arthropod vector-vector borne diseases. Confidence in the risk estimate was medium.

Low: The unmitigated risk is moderate for leishmaniasis-visceral (chronic). Risk is reduced to low by proper wear of the uniform and application of repellent to exposed skin. Confidence in the risk estimate is high.

6.3 Water Contact Diseases

Tactical operations or recreational activities that involve extensive contact with surface water such as lakes, streams, rivers, or flooded fields may result in significant exposure to leptospirosis and schistosomiasis. Risk is restricted primarily to areas along rivers and lakes. These diseases can debilitate personnel for up to a week or more. Leptospirosis risk typically increases during flooding.

6.3.1 Schistosomiasis

Moderate, unmitigated; Low, mitigated: Unmitigated health risk to U.S. personnel was moderate with seasonal transmission (April-November). Humans are the principal reservoir for schistosomes; humans shed schistosome eggs in urine or feces. Animals such as cattle and water buffalo may also be significant reservoirs. Rare cases (less than 0.1% per month attack rate) may occur among personnel wading or swimming in lakes, streams, or irrigated fields which were frequently contaminated with human and animal waste containing schistosome eggs. In groups with prolonged exposure to heavily contaminated foci, attack rates may exceed 10%. Exceptionally heavy concentrations of schistosomes may occur in discrete foci, which were difficult to distinguish from less contaminated areas. In non-immune personnel exposed to such foci, rates of acute schistosomiasis may be over 50%. Mild infections are generally asymptomatic. In very heavy acute infections, a febrile illness (acute schistosomiasis) may occur, especially with *Schistosoma japonicum* and *S. mansoni*, requiring hospitalization and convalescence over 7 days. Mitigation strategies in place include avoiding water contact and recreational water activities; proper wear of uniform, especially footwear, and protective coverings for cuts/abraded skin. .

6.3.2 Leptospirosis

Moderate, unmitigated; Low, mitigated: Unmitigated health risk to U.S. personnel was moderate with seasonal transmission (April-November). Human infections occur through exposure to water or soil contaminated by infected animals and is associated with wading, and swimming in contaminated, untreated open water. The occurrence of flooding after heavy rainfall facilitates the spread of the organism because as water saturates the environment leptospirosis present in the soil passes directly into surface waters. Leptospirosis can enter the body through cut or abraded skin, mucous membranes, and conjunctivae. Infection may also occur from ingestion of contaminated water. The acute, generalized illness associated with infection may mimic other tropical diseases (for example, dengue fever, malaria, and typhus), and common symptoms include fever, chills, myalgia,

nausea, diarrhea, cough, and conjunctival suffusion. Manifestations of severe disease can include jaundice, renal failure, hemorrhage, pneumonitis, and hemodynamic collapse. Recreational activities involving extensive water contact may result in personnel being temporarily debilitated with leptospirosis. Mitigation strategies in place include avoiding water contact and recreational water activities; proper wear of uniform, especially footwear, and protective coverings for cuts/abraded skin.

6.3.3 Overall Risk Levels

Short-term health risks: Moderate, unmitigated; Low to None, mitigated: The overall short-term unmitigated health risk associated with water contact diseases at COB Speicher and vicinity was considered moderate (for leptospirosis and schistosomiasis). Preventive measures such as avoiding water contact and recreational water activities; and protective coverings for cuts/abraded skin reduced the health risk to low to none. Confidence in the risk estimate was medium.

Long-term health risks: None identified based on available data. The confidence in the risk estimate is medium.

6.4 Respiratory Diseases

6.4.1 Tuberculosis (TB)

Moderate, unmitigated; Low, mitigated: Unmitigated health risk to U.S. personnel was moderate year round. Tuberculosis (TB) is usually transmitted through close and prolonged exposure to an active case of pulmonary or laryngeal TB, but can also occur with incidental contact. The risk of TB in U.S. Forces varies with individual exposure. TB was evaluated as part of the Post Deployment Health Assessment (PDHA). Mitigation strategies include routine medical screenings; enforcing minimum space allocation in housing units; implementing head-to-toe sleeping in crowded housing units; implementation of proper personal protective equipment (PPE), when necessary (treating active case, detainee operations); and active case isolation in negative pressure rooms, where available.

6.4.2 Meningococcal meningitis

Low: Unmitigated health risk to U.S. personnel was low year round. Meningococcal meningitis is transmitted from person to person through droplets of respiratory or throat secretions. Risk is comparable to the U.S. among unvaccinated personnel who have close contact with the local population. Close and prolonged contact facilitates the spread of this disease. Meningococcal meningitis is a potentially very severe disease typically requiring intensive care; fatalities may occur in 5-15% of cases. Mitigation strategies include routine medical screenings; enforcing minimum space allocation in housing units; implementing head-to-toe sleeping in crowded housing units; implementation of proper PPE, when necessary (treating active case, detainee operations); and active case isolation in negative pressure rooms, where available. Additional measures include vaccination and frequent sanitation of common use items (phones, door handles) and areas.

6.4.3 Short-term and Long-term health risks:

Short-term health risks: Moderate to Low, unmitigated; Low to None, mitigated: The overall short-term unmitigated health risk associated with respiratory diseases at COB Speicher and vicinity was considered moderate (for tuberculosis) to low (for meningococcal meningitis). Preventive measures such as vaccination; routine medical screenings; and active case isolation in negative pressure rooms reduced the health risk to low to none. Confidence in the risk estimate was medium.

Long-term health risks: None identified. TB is evaluated as part of the Post Deployment Health Assessment (PDHA). A TB skin test is required post-deployment if potentially exposed and is based upon individual Service policies.

6.5 Animal-Contact Diseases

6.5.1 Rabies

Moderate, unmitigated; Low, mitigated: Unmitigated health risk to U.S. personnel was moderate year round. Occurrence in local animals was well above U.S. levels due to the lack of organized control programs. Dogs were the primary reservoir of rabies in Iraq, and a frequent source of human exposure. In June 2008, the New Jersey Health department in The United States reported a confirmed case of rabies in a mixed-breed dog recently imported from Iraq. Rabies is transmitted by exposure to the virus-laden saliva of an infected animal, typically through bites, but could occur from scratches contaminated with the saliva. No cases of rabies acquired in Iraq have been identified in U.S. Service Members

to date. The vast majority (>99%) of persons who develop rabies disease will do so within a year after a risk exposure, there have been rare reports of individuals presenting with rabies disease up to six years or more after their last known risk exposure. Mitigation strategies included command emphasis of CENTCOM GO 1B, reduction of animal habitats, active pest management programs, and timely treatment of feral animal scratches/bites.

6.5.2 Anthrax

Low: Unmitigated health risk to U.S. personnel was low year round. Cutaneous and gastrointestinal anthrax are the most common forms of naturally occurring infection; cutaneous anthrax is transmitted by direct contact with infected animals or carcasses, including hides. Eating undercooked infected meat can result in contracting gastrointestinal anthrax. Pulmonary anthrax is contracted through inhalation of spores and is extremely rare. Cutaneous anthrax typically requires 1 to 7 days of supportive care with subsequent return to duty; gastrointestinal anthrax typically requires hospitalization, and has a high fatality rate if untreated. Mitigation strategies include consuming approved food sources, avoidance of animals and farms, dust abatement when working in these areas (wet mop, water sprayed on high volume traffic areas, etc.), and proper PPE for personnel working with animals, and immunization.

6.5.3 Q-Fever

Moderate, unmitigated; Low, mitigated: Unmitigated health risk to U.S. personnel was moderate year round. Rare cases were possible among personnel exposed to aerosols from infected animals, with clusters of cases possible in some situations. Significant outbreaks (affecting 1-50 percent) could occur in personnel with heavy exposure to barnyards or other areas where animals are kept. Unpasteurized milk may also transmit infection. The primary route of exposure is respiratory, with an infectious dose as low as a single organism. Q-Fever is a debilitating febrile illness, sometimes presenting as pneumonia, typically requiring 1 to 7 days of inpatient care followed by return to duty. Mitigation strategies include consuming approved food sources, avoidance of animals and farms, dust abatement when working in these areas (wet mop, water sprayed on high volume traffic areas, etc.), and proper PPE for personnel working with animals.

6.5.4 H5N1 avian influenza

Low: Unmitigated health risk to U.S. personnel was low year round. Extremely rare cases could occur in U.S. personnel who have close contact with birds or poultry infected with H5N1. H5N1 is a very severe illness. The fatality rate is higher than 50 percent in symptomatic cases. Mitigation strategies include avoidance with birds/poultry and proper cooking temperatures for poultry products.

6.5.5 Ophthalmomyiasis

Two cases of ophthalmomyiasis were identified in U.S. personnel in 2003. Many military facilities in Iraq are located in sites where livestock are or were housed, and sheep and goats graze freely throughout the country. The risk of ophthalmomyiasis to military personnel is minimal, but medical personnel should be aware that this condition exists to prevent misdiagnosis and thus ocular damage.

6.5.6 Overall Risk Levels

Short-term health risks: Moderate to Low, unmitigated; Low to None, mitigated: The overall short-term unmitigated health risk associated with animal contact diseases at COB

Speicher and vicinity was considered moderate (for rabies, Q-fever) to Low (for anthrax, H5N1 avian influenza, ophthalmomyiasis). Preventive measures such as consuming approved food sources; immunization; and avoidance of animals and farms reduced the health risk to low to none. Confidence in risk estimate was medium.

Long-term health risks: Low (for rabies). The confidence in the risk estimate is medium.

7 Venomous Animal/Insects

There are a number of medically relevant venomous species that have acknowledged geographical ranges within Iraq. No specific hazard sources for COB Speicher (and the associated locations) were documented in Defense Occupational and Environmental Health Readiness System (DOEHRS) or the MESL.

The medically relevant venomous species include eleven species of poisonous snakes (*Cerastes cerastes, Cerastes gasperettii, Macrovipera lebetina euphratica, Macrovipera lebetina obtusa , Malpolon moilensis, Malpolon monspessulanus, Telescopus fallax, Telescopus nigriceps, Telescopus tessellatus, Vipera albicornuta, Walterinnesia aegyptia*), seventeen species of poisonous scorpions (*Androctonus crassicauda, Buthacus leptochelys, Buthacus macrocentrus, Compsobuthus jakesi, Compsobuthus matthiesseni, Compsobuthus werneri, Euscorpius italicus, Hemiscorpius lepturus, Hottentotta saulcyi, Hottentotta scaber, Hottentotta schach, Mesobuthus caucasicus, Mesobuthus eupeus, Odontobuthus doriae, Orthochirus iraqus, Orthochirus scrobiculosus, Scorpio maurus*), and one species of poisonous spiders (*Latrodectus pallidus*).

8 Heat/Cold Stress

8.1 Heat

The highest monthly mean of the daily temperatures at COB Speicher (and the associated locations) is 111 degrees Fahrenheit that typically occurs during the summer months.

Short-term health risks: Moderate, unmitigated; Low, mitigated. The short-term risk of heat injury is Moderate in unacclimated personnel. However, the risk may be greater to certain susceptible persons–those older (i.e., greater than 45 years), in lesser physical shape, or with underlying medical/health conditions. Long-term health implications from heat injuries are rare but can occur, especially from more serious injuries such as heat stroke. Risk is reduced to Low through preventive measures such as work-rest cycles, appropriate hydration, and uniform modification, when appropriate. It is possible that high heat in conjunction with various chemical exposures can increase long-term health risks, though specific scientific evidence is not conclusive.

Long-term health risks: The long-term risk is Low. Long-term health implications from heat injuries are rare but can occur–especially from more serious heat injuries such as heat stroke. However, the risk may be greater to certain susceptible persons–those older (i.e., greater than 45 years), in lesser physical shape, or with underlying medical/health conditions. Confidence in these risk estimates is medium.

8.2 Cold

The lowest monthly mean of the daily temperatures for COB Speicher (and the associated locations) is 32 degrees Fahrenheit that typically occurs during the winter months

Short-term and Long-term risks: The risk of cold injury is low. Confidence in this risk estimate is medium.

9 Noise

9.1 Continuous:

According to the 2006 Environmental Health Site Assessment at COB Speicher, most generators observed on the installations were located away from area troop living and working areas and contained some form of sound barrier (concrete barricades or sand bags). Even though Speicher has an active runway, environmental noise from aircraft operations did not contribute significantly to environmental noise. A noise hazard survey conducted at the Speicher oxygen plant indicated that sound levels were within Occupational Safety and Health Administration and U.S. Army noise standards and recommended personnel wear earplugs or earmuffs as a precaution. Insufficient information exists to assess the level of risk.

Short-term and Long-term risks: Not Evaluated-no available continuous noise evaluation information. No identified health risks.

9.2 Impulse:

No impulse noise evaluations were conducted so impulse noise was not evaluated for this POEMS.

Short-term and Long-term risks: Not Evaluated-no available impulse noise evaluation information. No identified health risks.

10 Other Unique Occupational Hazards

10.1 Fuel/petroleum products/industrial chemical spills

A crude oil pipeline and a refined product pipeline ruptured in May 2003 and spilled crude oil and refined product into the soil adjacent to the pipelines. The site of the spill was near the perimeter of the COB, significantly away from any activities of COB personnel. A soil berm was created to contain the spill however; the spilled product may have migrated off the camp due to being in a low lying area that is flooded during the rainy season. It is unknown how much of the product may have migrated or to what extent it has penetrated the local area. Samples of soil from the site of the ruptured pipelines were collected in 2003, 2004, and 2005 and samples of well water that would be used for non-drinking purposes were collected at the site of the ruptured pipelines in 2004. No hazards were identified in the soil samples. Sulfate presented a low non-drinking acute risk in the well water samples. Sulfate is not a component or byproduct of crude or refined oil so the acute risk is not associated with the pipeline spills.

Short-term and Long-term risks: None.

10.2 Waste Sites/Waste Disposal:

Solid wastes at COB Speicher were disposed of in the burn pits at the location. Medical wastes that were generated from the COB Speicher Hospital and the outlying troop clinics

were collected and consolidated at COB Speicher Hospital before being incinerated in the medical waste incinerator. The volume of medical wastes generated is not known.

Short-term and Long-term risks: Low. Though sparse qualitative data on waste sites and waste disposal were available, the health risks from physical hazards of solid/medical wastes at COB Speicher are low due to waste disposal, collection, and processing sites being access controlled.

10.3 Asbestos:

Asbestos was sampled for in bulk samples from the Bakery and from Building 1502 ceiling tiles in 2006. Asbestos was sampled for in roof materials from Buildings 3009 and 3010 and insulation material and walls in Building 2707 in 2008. Asbestos samples were collected from Building 3504 in December 2010. None of the samples contained asbestos fibers. Asbestos fibers were detected in one bulk sample from Fire Station No. 2 at COB Speicher. However, if the sampled material in the firehouse is in good condition and will not be disturbed (for example, by renovation or remodeling), it is not a health hazard and should be left alone. If the material is damaged and/or friable, it should be removed or encapsulated to minimize eliminate asbestos fibers being released into the air.

Short-term and Long-term risks: None identified based on available data. Confidence in risk estimate is low.

10.4 Lead Based Paint:

No specific information was available to assess this hazard.

Short-term and Long-term risks: Unknown.

10.5 Pesticides/Pest Control:

No specific information was available to assess this hazard.

Short-term and Long-term risks: Unknown. .

10.6 Burn Pits:

Two open burn pits operated at the COB Speicher. The primary hazards are smoke from incomplete combustion associated with burning plastics, paper, wood, rubber, POL products, non-medical waste, some metals, and some chemicals (paints, solvents, etc.). A completed air exposure pathway exists for personnel working at the burn pit; however, no source air samples specifically associated with the burn pit were noted. The open burn pits at COB Speicher closed in December 2010.

Short-term and Long-term risks: Low.
While not specific to COB Speicher (and the associated locations), the consolidated epidemiological and environmental sampling studies on burn pits that have been conducted to date to address health risk generally show little or no health impact at the population level, several years post-deployment on the long-term health of personnel assigned to a burn pit location. The DoD recognizes that acute symptoms due to smoke exposure may occur, including reddened eyes, irritated respiratory passages, and cough that may persist for some time. While no long-term health risks have yet been identified at a population-level, it is plausible that a smaller number of Service Members may be affected by longer-term health effects, possibly due to combined exposures (such as sand/dust, industrial

pollutants, tobacco, smoke and other agents) and individual susceptibilities such as preexisting health conditions or genetic factors.

11 References[2]

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3. DoDI 6055.05, Occupational and Environmental Health, 2008.
4. DoD MESL Data Portal: https://mesl.apgea.army.mil/mesl/.Some of the data and reports used may be classified or otherwise have some restricted distribution.
5. JCSM (MCM) 0028-07, Procedures for Deployment Health Surveillance, 2007.
6. USAPHC (Provisional), Technical Guide 230, Environmental Health Risk Assessment and Chemical Exposure Guidelines for Deployed Military Personnel, June 2010 Revision.
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[2] NOTE. The DOEHRS-IH (EH Business Area) database was queried to obtain the available sample data for air, soil, and drinking and non-drinking water sources at COB Speicher. The data are currently assessed using the June 2010 Revision of TG230 described above. The general method involves an initial review of the data which eliminates all chemical substances not detected above 1-yr 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 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 SMEs, which includes comparison to any available marginal, critical or catastrophic MEGs. For drinking water 15 L/day MEGs are used for the screening while site specific 5-15 L/day are used for more detailed assessment. For non-drinking water (such as that used for personal hygiene or cooking) the 'consumption rate' is limited to 2 L/day (similar to the EPA) which is derived by multiplying the 5 L/day MEG by a factor of 2.5. This value is used to conservatively assess non-drinking 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 (FHP & R).
U.S. Army Public Health Command (USAPHC) 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
U.S. Air Force School of Aerospace Medicine (USAFSAM) (formerly AFIOH) Phone: (888) 232-3764. http://www.brooks.af.mil/units/airforceinstituteforoperationalhealth/index.asp
DoD Force Health Protection and Readiness (FHP & R) Phone: (800) 497-6261. http://fhp.osd.mil