Last Updated: 17 March 2011

Military Deployment
Periodic Occupational and Environmental Monitoring Summary (POEMS):
Name: Ali al Salem Air Base (AASAB), Kuwait

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

NOTE: This is a correction to the POEMS dated 21 January 2011. There was an error in the calculation for long term risk assessment for PM 2.5. The correction is reflected in this POEMS and the January 2011 version should be considered invalid.

PURPOSE: This POEMS documents the DoD assessment of base camp level occupational and environmental health (OEH) exposure data for **AASAB**. It presents the identified health risks and associated medical implications. The findings are based on information collected from **May 2003 through September 2010** to include OEH sampling and monitoring data (e.g. air, water, and soil), field investigation and health assessment reports, as well as country and area-specific information on endemic diseases. While this assessment may reflect similar exposures and risks pertaining to historic or future conditions at this site, the underlying data is limited to the time period(s) and area(s) sampled and thus may not reflect fluctuations or unique occurrences. It also may not be fully representative of all the fluctuations during the timeframe. To the extent data allow, this summary describes the general ambient conditions at the site and characterizes the risks at the *population–level*. While useful to inform providers and others of potential health effects and associated medical implications, it does not represent an individual exposure profile. Actual individual exposures and specific resulting health effects depend on many variables and, should be addressed in individual medical records by providers as appropriate at the time of an evaluation of a unique exposure.

SITE DESCRIPTION: AASAB is located approximately 45 kilometers (km) west of Kuwait City. The installation is the primary training center for the Kuwaiti Air Force. The three major tenants are the Air Force's 386 Air Expeditionary Wing (386 AEW) operating out of the "Rock" and the "Quarry," the Navy's Construction Battalion (SeaBees) operating out of Camp Moreell (also written as Camp Morell in some documents), and the Army's Theater Gateway operating out of the Life Support Area (LSA).

SUMMARY: The table on the following page provides a list of the overall identified health risks at **AASAB**. Summarized below are the key health risks estimated to present a Moderate or greater risk of medical concern along with recommended follow-on medical actions that providers should be aware. As indicated in the detailed sections that follow the 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 noted but not routinely available/feasible.

Short-term health risks & medical implications: The following may have caused acute health effects in some personnel during deployment at AASAB: inhalable coarse particulate matter less than 10 micrometers in diameter (PM_{10}), inhalable fine particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$), food/waterborne diesease, and heat stress. While for the most part any associated effects from the above should have resolved post-deployment, providers should be prepared to consider relationships to current complaints. Personnel who reported with symptoms or required treatment while at this site should have exposure/treatment noted in medical records/on SF600 or equivalent.

Long-term health risks & medical implications: The types of hazards associated with potential long-term health effects at AASAB include $PM_{2.5}$), visceral leishmaniasis and for certain populations, continuous noise. It is considered possible that some otherwise healthy personnel who were exposed for a long-term period to $PM_{2.5}$ levels 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 $PM_{2.5}$ exposures are documented and archived, at this time there are no specific recommended, post-deployment medical surveillance evaluations or treatments. However, providers should consider overall individual health status (e.g., any underlying conditions/susceptibilities). Likewise—especially for noise hazards—providers should consider any potential unique individual exposures (such as occupational or specific personal dosimeter data) when assessing individual concerns. For example, at all bases certain individuals need to be followed/evaluated for specific occupational exposures/injuries (e.g., annual audiograms as part of the medical surveillance for those enrolled in the Hearing Conservation Program; and personnel covered by Respiratory Protection Program and/or Hazardous Waste/Emergency Responders Medical Surveillance).

Where Do I Get More Information?

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

US Army Public Health Command (Provisional) (USAPHC Prov)	**Navy and Marine Corps Public Health Center (NMCPHC)**	**US Air Force School of Aerospace Medicine (USAFSAM) EOSH Service Center**	**DoD Force Health Protection and Readiness (FHP & R)**
Phone: (800) 222-9698 http://phc.amedd.army.mil/Pages/default.aspx	(formerly NEHC) Phone: (757) 953-0700 http://www-nehc.med.navy.mil	Phone: (888) 232-3764 https://kx.afms.mil/esoh	Phone: (800) 497-6261 http://fhp.osd.mil

Occupational and environmental sampling data are available in Defense Occupational and Environmental Health Readiness System (DOEHRS) at https://doehrs-ih.csd.disa.mil/Doehrs/. Additional environmental health reports/information is in the DoD OEHS Data Portal: https://doehsportal.apgea.army.mil/doehrs-oehs/ Regional/country info on endemic/infectious disease from National Center for Medical Intelligence (NCMI) is at https://www.intelink.gov/ncmi/index.php.

POEMS

Population-Based Health Risk Estimates – AASAB[1, 2]

Sources of Identified Health[3]	Health Risk Assessment Summary[4]	
	Short Term Health Risk	**Long Term Health Risks**
AIR	**Airborne Substances – Overall Short Term Risks: Variable (Low to High)**	**Airborne Substances – Overall Long-Term Risks: Variable (Low to High)**
Particulate matter (PM_{10})	Variable (Low to High).	Not evaluated-no available health guidelines.
Particulate matter ($PM_{2.5}$)	Variable (Low to High).	Variable (Low to Moderate)
Metals	Low	Low
Chemical Pollutants	Low	Low
SOIL	**Soil - Overall Short Term Risks: Not Evaluated**	**Soil - Overall Short Term Risks: Low**
Metals, organic and inorganic compounds	Not evaluated per current USAPHC protocols.	Low
WATER	**Waterborne Substances – Overall Short Term Risks: None Identified**	**Waterborne Substances – Overall Long Term Risks: None Identified**
Used for Drinking	None Identified – Not Evaluated	None Identified – Not Evaluated
Used for Other Purposes	None Identified – Not Evaluated	None Identified – Not Evaluated
MILITARY UNIQUE	**Military Unique – Overall Short Term Risks: Low**	**Military Unique – Overall Long Term Risks: Low**
(e.g. CBRN; Depleted Uranium; Ionizing/Non ionizing radiation)	None Identified	None Identified
ENDEMIC DISEASE	**Endemic Disease – Overall Short Term Risks:** Variable Low to High	**Endemic Disease – Overall Long Term Risks: Low**
Food borne/Waterborne (e.g., diarrhea- bacteriological)	Variable (Low to High). Risk is reduced with preventive medicine measures.	Low
Arthropod Vector Borne	Variable (Low to Moderate). Risk is reduced with preventive medicine measures.	Low
Respiratory	Low	A TB Skin test is required post-deployment if personnel were potentially exposed to TB.
Water-Contact (e.g. wading, swimming)	Low	None Identified
Animal Contact	Low	None Identified
VENOMOUS ANIMAL/INSECTS	**Venomous Animals/Insects – Overall Short Term Risks: Low**	**Venomous Animals/Insects – Overall Long Term Risks: Low**
Snakes, scorpions, and spiders	Low	None Identified
HEAT/COLD STRESS	**Heat/Cold – Overall Short Term Risks: Variable Low to High**	**Heat/Cold – Overall Long Term Risks: Low**
Heat/Cold	Variable (Low to High). Risk reduced with preventive medicine controls/mitigation	None Identified
NOISE	**Noise – Overall Short Term Risks: Low**	**Noise – Overall Long Term Risks: Variable Low to High**
Continuous	Low	Low for office workers Moderate to High for flight-line & maintenance personnel
Impulse	Low	Low
OTHER UNIQUE OCCUPATIONAL	**Other – Overall Short Term Risks: Low**	**Other – Overall Long Term Risks: Low**

HAZARDS		
(e.g. pesticides, asbestos, lead-based paint, waste disposal)	Low	Low

[1] This summary table provides a qualitative estimate of population-based short- and long-term health risk s associated with the general ambient and occupational environment conditions at **AASAB.** It does not represent a unique individual exposure profile. Actual individual exposures and health effects depend on many variables. For example, while a chemical may be present in the environment, if a person does not inhale, ingest, or contact a specific dose of the chemical for adequate duration and frequency, then there may be no health risk. Alternatively, a person at a specific location may experience a unique exposure – such as contact with JP-8 which has been reported at this site - which could result in a significant individual exposure. Any such person seeking medical care should have their specific exposure documented in an SF600 or equivalent.

[2] This assessment is based on specific data and reports obtained from the **July 2005 through September 2010** timeframe. It is considered a current 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 is organized by major categories of identified sources of health risk. It only lists those sub-categories specifically identified and addressed at **AASAB** 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 of the exposure that would produce such health effects. Details can be obtained from the USAFSAM. Where applicable, "None Identified" is used when though an exposure was identified, no risk of either a specific acute or chronic health effects were determined. More detailed descriptions of OEH exposures that were evaluated but determined to pose no health risk are discussed in the following sections of this report.

[4] Risks in this summary table are based on quantitative surveillance thresholds (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.

REFERENCES: Ali al Salem Air Base, Kuwait POEMS

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

Site description and baseline information obtained from:
5. AASAB Occupational and Environmental Health Site Assessment, dated December 2010.

Sampling data were obtained from the:
6. Defense Occupational and Environmental Health Readiness System (DOEHRS) at https://doehrs-ih.csd.disa.mil/Doehrs/. Some of the data may be classified or otherwise have some restricted distribution. See discussion below.

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

Chemical hazards (air, water, soil) evaluated based on military exposure guidelines (MEGs) and risk assessment methodology in:
8. USACHPPM TG230, (Jun 2010) Chemical Exposure Guidelines for Deployed Military Personnel TG230. For further information, contact USAPHC (Prov) Environmental Health Risk Assessment Program at: commercial 410-436-2953 or DSN 584-2953.
9. USACHPPM, Particulate Matter Factsheet No. 64-009-0708, 2008.

Regional/country information on endemic/infectious disease and heat/cold from the:
10. National Center for Medical Intelligence (NCMI) Web site is: https://www.intelink.gov/ncmi/index.php

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

Discussion of Health Risks at AASAB by Source

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

Limitations:

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

1. AIR

Site-Specific SOURCES Identified (all those checked):

☒ Wind-blown Sand	☐ Commercial Industry _____	☒ Other : vehicles
☐ Burn pits	☐ Agricultural	☐ Not Determined

Assessment of Data and Identified Risks

Particulate matter, 10 microns (PM_{10}) (see CHPPM 2008 PM factsheet; 64-009-0708 for more details)	**Sample Data/Notes:** Exposure Guidelines: Short-term (24-hour) PM_{10} MEGs expressed in micrograms per cubic meter ($\mu g/m^3$): Negligible MEG=250, Marginal MEG=420, Critical MEG=600; Long-term (1-Year) PM10 MEG: Not available (see chronic risk note). Degree of risk is estimated based on comparison of concentrations to specified MEGs. The range of 24-hour PM10 concentrations in 168 samples from July 2005–November 2008 was 6 to 1700 $\mu g/m^3$. The average concentration was 261$\mu g/m^3$, the standard deviation was 302.5 $\mu g/m^3$ and the median was 166.1 $\mu g/m^3$. There was no sampling data available for 2003, 2004, 2009, or 2010.
	Short-Term Health Risk: Variable Low to High. Short term risk is based on comparison of daily concentrations to 24-hour MEGs. The variability in the risk is due to significant fluctuation in the daily concentration. The risk assessment is based on sampling data from 2005-2008. Overall, 123/168 (73%) of the sampling days had concentrations below the 24-hour negligible MEG (LOW Risk); 26/168 (15%) sampling days were between the 24-hour negligible and the 24 hr marginal MEG (LOW RISK); 4/168 (2%) samples were between the 24-hour marginal and 24 hr critical MEG (MODERATE Risk); 16/168 (10%) samples were greater than the critical MEG (HIGH Risk). Confidence is low to medium based on limitations in sampling data. Respiratory effects can increasingly impact real-time health and mission capabilities as they exceed higher levels of MEGs. Acute effects to relatively healthy troops are mostly eye, nose, and throat irritation, and respiratory effects (sneezing, adaptive responses such as coughing, sinus congestion and drainage) that can be exacerbated by increased activity. These effects are consistent with those generally reported from the field.
	Long-Term Health Risk: Not Evaluated-No available health guidelines**.** The USEPA has retracted its long-term standard (National Ambient Air Quality Standards [NAAQS]) for PM_{10} due to an inability to clearly link chronic health effects with long-term PM10 exposure levels.
Particulate	**Sample Data/Notes:** Exposure Guidelines: Short-term (24-hour) $PM_{2.5}$ MEGs ($\mu g/m^3$): Negligible MEG=65, Marginal MEG=250, Critical MEG=500; Long-term (1-year) $PM_{2.5}$ MEGs: Negligible

matter, 2.5 microns ($PM_{2.5}$) (see CHPPM 2008 PM factsheet; 64-009-0708 for more details)	MEG=15, Marginal MEG=65. Degree of risk is estimated based on comparison of concentrations to specified MEGs. The range of 24-hour $PM_{2.5}$ concentrations in 106 samples from November 2005–September 2010 was 2 to 613 µg/m^3. The average was 89 µg/m^3, the standard deviation was 100.5 µg/m^3 and the median was 59.7 µg/m^3. There was no sampling data available for 2003, 2004, or 2007.
	Short-Term Health Risk: Variable Low to High. Short term risk is based on comparison of daily concentrations to 24-hour MEGs. The variability in the risk is due to significant fluctuation in the daily concentration. The risk assessment is based on sampling data from 2005-2008. OVERALL: 63/106 (59%) sampling days had concentrations below the negligible MEG (LOW RISK), 39/106 (37%) sampling days had concentrations between the 24 marginal and negligible MEGs (LOW RISK), 2/106 (2%) sampling days had concentrations between the 24 hr marginal and critical MEGs (MODERATE RISK), 2/106 (2%) sampling days had concentrations greater than the 24 hr critical MEG (HIGH RISK). Confidence is low to medium based on limitations in sampling data. During the highest levels of $PM_{2.5}$, a few personnel may have experienced only mild effects. Preexisting health conditions (i.e. asthma or cardiovascular diseases) may have been exacerbated. On most days, some or all of these same health effects could occur in some personnel, but at even lower amounts than those noted above during the highest levels of PM 2.5.
	Long-Term Health Risk: Variable Low to Moderate. Long-term risk is based on comparison of the yearly average sample concentration to the long-term MEGs. The variability in the risk is due to significant fluctuation in the daily concentration. There was no sampling data available for 2003, 2004, or 2007. Unlike PM_{10}, long-term $PM_{2.5}$ exposures are potentially associated with certain long-term health consequences. The annual average for 2005 is 41, which is between the negligible and the marginal MEGs (LOW Risk); the annual average for 2006 was 55, which is between the negligible and the marginal MEGs (LOW Risk), the annual averages for 2008-2010 were 84, 109, and 124 respectively. All of these are greater than the 1-year marginal MEG (MODERATE Risk). Confidence in risk estimate is low due to limitations in field data and health effects data. With repeated exposures above the 1 yr marginal MEG, 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 [COPD], asthma, atherosclerosis, or other cardiopulmonary diseases) increases. Those with a history of asthma or cardiopulmonary disease have a higher risk for developing these chronic conditions.
Metals	**Sample Data/Notes:** 124 samples were collected from November 2005-November 2008. None of the analyzed metals were found at concentrations above a short or long term term MEG. Three of the analyzed metals were detected above a long term MEG: beryllium, cadmium, and vanadium. The degree of risk is estimated based on the comparison of metals results to specified MEGs.
	Short and Long-Term Health Risk: Low. All contaminants measured at concentrations below MEGs. Three contaminants have detection limits greater than the MEG (Beryllium, Cadmium, and Vanadium). Since these contaminants weren't detected in any of the samples and there is expected source of these contaminants, no further assessment was needed (based on guidance in TG 230 paragraph 3.4.4.4). Confidence is this risk assessment is low based on limitations in sampling data and analytical limits of detection.
Chemical Pollutants (gases and vapors)	**Sample Data/Notes:** Six ambient air Volatile Organic Compounds (VOC) samples were collected in November 08. None of the analytes were found at concentrations above a short or long term MEG. No semi-VOC samples were collected over the time period.
	Short and Long-Term Health Risk: Low. All contaminants were measured at

	concentrations below the MEGs. Confidence in this risk assessment is low based on the relatively small data set and limitations in the sampling data.

2. SOIL		
Site-Specific SOURCES of Contaminants Identified (all those checked):		
☐ Waste Site/Burn pits	☐ Commercial Industry _____	☒ None
☐ Agricultural	☐ Other : vehicles	☐ Not Determined
No evidence of sources that could results in contaminated soil (no pre-existing hazardous waste sites/spills)		
Assessment of Data and Identified Risks		
Analyses includes metals/ inorganics as well as organics	**Sample Data/Notes:** Eleven samples were collected from December 2004 to May 2006. Risks are determined based on comparison to available MEGs. There were no contaminants were detected at levels greater than the 1-year negligible MEG.	
	Short-Term Health Risk: Currently sampling data for soil is not evaluated in an acute risk assessment.	
	Long-Term Health Risk: Low. All contaminants measured at concentrations below MEGs. Confidence in this assessment is low based on the relatively small number of samples collected over the time period and limitations in the sampling data.	

3.a. WATER: Used for Drinking			
Identified Water Supplies			
☒ Bottled; Local procured	☐ Military Bottled/Packaged (unknown)	☐ ROWPU	☐ Municipal Sources
Bottled water is the primary source of drinking water for all deployed personnel in Kuwait. The distributors and all brands of bottled water are approved by the Army's Veterinary Service. Bottled water for LSA and Camp Moreell is purchased by the Army and is tested monthly by the Army's Veterinary Service, the environmental division of CSA contracting company, or the Navy's Forward Deployed Preventive Medicine Unit. Monitoring includes total coliform presence/absence and *E. coli*. Bottled water purchased by the Air Force for the "Rock" and "Quarry" is tested by base bioenvironmental engineering. When a new lot is received it is not released for base distribution until tested and cleared by bioenvironmental engineering. The AF monitoring includes total coliform presence/absence and E. coli for each lot. In addition, one random bottle of water is tested monthly using the M-272 kit.			
Assessment of Data and Identified Health Risks			
Analyses include metals/inorganics as well as organics	**Sample Data/Notes:** In addition to the field sampling discussed above, one water sample was collected in July 2008 and sent to USAPHC for analysis. No analytes were detected at concentrations greater than a MEG. Bottled water plants are inspected and approved annually by US Army VETCOM. Each bottled water plant is inspected annually.		
	Short and Long-Term Health Risk: Not evaluated. One sample collected over a period of 6 years does not provide sufficient data to perform an accurate health risk assessment.		

3.b. WATER: Used for Purposes other than Drinking **(Personal Hygiene, Cooking, Showering, etc)**			
Identified Water Supplies			
☐ Bottled; Local procured	☐ Military Bottled/Packaged (unknown)	☐ ROWPU	☒ Municipal Sources
Desalinated seawater is the primary source of potable water in Kuwait. The water is filtered and treated to meet Kuwaiti Environmental Public Authority (K-EPA) standards. The water distribution system on AASAB is used for personal hygiene, cooking, and dishwashing. The system may become contaminated during distribution because of aging or corroded pipes, poor system integrity, pressure fluctuations from power shortages causing back siphoning, and subsequent microbial or chemical infiltration. A complete assessment of the Kuwait water distribution system is not possible due to access and travel restrictions. Non-potable water distribution for Camp Moreell and LSA is trucked in from Camp Arifjan. The water trucks fill			

the water tanks on a daily basis. Routine field testing of tap water is conducted monthly by the environmental division of CSA contracting company and the FDPMU. Monitoring includes total coliform presence/absence and *E. coli*.

The water for the rest of the base is provided by a desalination plant in Doha that is fed to a cistern and four tanks on the Kuwaiti side of the base through a pumping station in Jahra. There is one line from the cistern that feeds the "Rock" where the water is chlorinated and then distributed on the "Rock." This system is also looped back to the "Quarry" where it is also connected to the water provided to the Kuwaiti side of the base. Routine testing of tap water is conducted monthly on the "Rock" and Quarry" by 386 EMDG/SGPB. Monitoring includes total coliform presence/absence and *E. coli*, pH, chlorine residual, and M272. Additionally, an annual comprehensive screening analysis is taken and submitted to USAPHC IAW *TB Med 577*. All Results are loaded in DOEHRS DoD Surveillance program office.

While the water provided in the distribution systems meets *TB Med 577* for water potability, the systems are classified as non-potable due to lack of backflow prevention devices and the risk of infiltration to the aging system. The system can be used for brushing teeth, washing clothes, washing dishes, and taking showers.

Water must meet potable water standards per *TB Med 577*. Routine field tests conducted by 386 EMDG/SGPB and FDPMU include bacteriological, CBRN, free available chlorine (FAC) and other sanitation surveillance parameters per *TB Med 577*.

Assessment of Data and Identified Health Risks

Analyses include metals/inorganics as well as organics	**Sample Data/Notes:** In addition to the field monitoring described above, 8 water samples were collected from December 2004 – June 2010 and submitted to USAPHC for analysis None of the analytes sampled were found at concentrations above a long term MEG.
	Short and Long-Term Health Risk: Not evaluated. Eight samples collected over 6 days in a period of 6 years do not provide sufficient data to perform an accurate health risk assessment.

4. MILITARY UNIQUE

Chemical Biological, Radiological Nuclear (CBRN) Weapons:

There is no evidence of exposure to AASAB personnel.

Short and Long-Term Health Risk: None Identified

Depleted Uranium (DU):

DU munitions are not stored or worked on at AASAB. The only source of DU at AASAB is the counterweight of the tail in the C-130 aircraft. There is no evidence of exposure to AASAB personnel.

Short and Long-Term Health Risk: Low

Ionizing Radiation

Medical and Dental radiography are utilized in the EMEDS Clinic. The radiology technician is the only individual enrolled in the thermoluminescent dosimetry (TLD) program, with no exposures recorded in the last six quarters. Industrial radiography is utilized in the Contingency Aeromedical Staging Facility (CASF) for the anti-hijacking screening process, by explosive ordnance disposal (EOD) for inspections, CE emergency management, and at the personnel search area at the Marauder Gate. Thirty-day TLD studies were performed throughout the EMDG buildings and at the base ECP. The results of these two studies showed a deep dose of 0 mrem, indicate exposures are well below the general population authorized dose of 100 mrem per year. Permitted radioactive materials and generally licensed devices are used in CBRNE detection equipment. Semi-annually radioactive material leak tests were conducted on ESFS generally licensed RAM and were all <2.8 pCi, indicating no leakage above the limit for generally licensed devices (0.005 microcurie, 10 CFR 31.5).

Short and Long-Term Health Risk: Low

Non-Ionizing Radiation

Lasers: The C-17 aircraft has a LAIRCM with a Nominal Optical Hazard Distance (NOHD) of 200 ft. The AN/PEQ-2A used by 386 ESFS has a NOHD up to 263 meters. Administrative procedures are in place to reduce incidents. The biggest risk is lasing of aircrews while flying. Aircrew personnel have ALEPs available and are required to be worn by CENTAF aircrews. All personnel lased are evaluated by a flight surgeon, and if necessary an optometrist at Camp Arifjan. This is documented on the SF600 and placed in their medical record. The 386 CES/CEX has a class 3B laser system for unknown chemical identification. The laser has a hazard distance of 14

inches.
EMF: Aircraft emitters have administrative processes in place to reduce the potential for exposures. Groundbased emitters have been evaluated and have administrative controls in place that ensure personnel are not within the uncontrolled environment hazard distance. Operators of these systems are aware to notify 386 EMDG/SGPB for any potential exposure to EMF radiation to be investigated and documented.

Short and Long-Term Health Risk: Low

5. ENDEMIC DISEASE

(based on NCMI **[26 February 2009]** (https://www.intelink.gov/ncmi/index.php)

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

Foodborne and Waterborne Diseases

Sanitation varies with location but typically is below U.S. standards. Local food and water sources (including ice) may be contaminated with pathogenic bacteria, parasites, and viruses to which most U.S. service members have little or no natural immunity. Diarrheal diseases can be expected to temporarily incapacitate a high percentage of personnel within days if local food, water, or ice is consumed. Hepatitis A can cause prolonged illness in a smaller percentage of unvaccinated personnel. Key disease risks are summarized below:

Diarrheal diseases (bacteriological) can be expected to temporarily incapacitate a very high percentage of personnel (potentially 11-50% per month) within days if local food, water, or ice is 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 hrs with appropriate therapy.
Hepatitis A, typhoid fever, and diarrhea- protozoan can cause prolonged illness and have an intermediate risk, although cases are rare. Though much rarer, other potential diseases in this area include; hepatitis E, and brucellosis.

Short -Term Health Risk: Variable Low to High. The overall short-term risk associated with foodborne and waterborne diseases is considered LOW for hepatitis, typhoid fever, and protozoan diarrhea and HIGH for bacterial diarrhea if local food or water is consumed on the economy. Local food and water may be consumed by personnel that frequently travel off-base for official purposes. Preventive medicine (PM) measures reduce the risk on AASAB to LOW at the base dining facilities and approved on-base venders who are inspected at least monthly.

Long-Term Health Risk: Low

Arthropod Vector-Borne Diseases

Ecological conditions in rural areas support arthropod vectors, including ticks and sand flies, with variable rates of disease transmission. A variety of vector-borne diseases occur at low levels. Individually, most of these diseases are likely to cause only rare cases, but the overall risk may be significant in some areas.

Leishmaniasis is a disease transmitted by sand flies. The disease risk is highest when sand flies are most prevalent in July through late September. There are two forms of the disease – cutaneous (acute form) and visceral, a more latent form of disease. The leishmaniasis parasites may survive for years in infected individuals and this infection may go unrecognized by physicians back in the U.S. **Sandfly fever, Typhus- murine (fleaborne), West Nile fever, and Sindbis** are also present and all have a Low risk.

Short and Long-Term Health Risk: Variable Low to Moderate. Risk is reduced to Low with proper PM controls implemented by treating uniforms with permethrin (except flight suits) and the application of DEET to exposed skin as necessary to prevent bites. Leishmaniasis: Risk is Moderate for cutaneous (short-term); Low for the visceral (long-term) leishmaniasis, Sandfly fever, Typhus-murine, West Nile fever, and Sindbis.

Water Contact Diseases

Leptospirosis; the disease has been identified in rare cases in Kuwait; Human infection occurs through exposure to water or soil contaminated by infected animals and has been associated with wading, and swimming in contaminated, untreated open water. The occurrence of flooding after heavy rainfall facilitates the spread of the organism because, as water saturates the environment, Leptospira present in the soil pass directly into surface waters. Leptospira can enter the body through cut or abraded skin, mucous membranes, and conjunctivae. Ingestion of contaminated water can also lead to infection. The acute generalized illness associated with infection can mimic other tropical diseases (for example, dengue fever, malaria, and typhus), and common symptoms include fever,

chills, myalgia, nausea, diarrhea, cough, and conjunctival suffusion. Manifestations of severe disease can include jaundice, renal failure, hemorrhage, pneumonitis, and hemodynamic collapse. Military operations at **AASAB** do not involve extensive water contact which may result in personnel being temporarily debilitated with leptospirosis.

Short and Long-Term Health Risk: While the risk in Kuwait is Moderate (short-term) risk, the risk to AASAB personnel is Low.

Long-Term Health Risk: None identified.

Respiratory Diseases

Tuberculosis (TB), meningococcal meningitis, and hantavirus hemorrhagic fever with renal syndrome have a risk comparable to the US.
Short and Long-Term Health Risk: The short-term and long-term health risk to respiratory diseases is Low.

Animal- Contact Diseases

Q-fever; disease is assessed as present, but levels are unknown; rare cases possible among personnel exposed to aerosols from infected animals, with clusters of cases possible in some situations. Significant outbreaks (affecting 1-50%) can occur in personnel with heavy exposure to barnyards or other areas where animals are kept. Unpasteurized milk may also transmit infection. – NOTE: while cattle, sheep and goats are primary carriers of this bacteria – camels, common in the area, are also reported/known to be carriers.
Rabies - risk is Low and comparable to the US, and H5N1 avian influenza risk is Low and extremely rare.

Short -Term Health Risk: The risk in Kuwait is Moderate (Q-fever) to LOW (short-term) due to rare occurrence, the risk to AASAB personnel on-base is Low.

Long-Term Health Risk: None identified.

6. VENEMOUS ANIMAL/INSECT

Snakes, scorpions, and spiders

Cerastes gasperettii (Arabian horned viper) – venom primarily hemotoxic. Local symptoms may include pain, edema, redness; may have hematoma at site of bite & regional lymphadenopathy. No human fatalities reported (at least not documented), so far. No known antivenom currently produced.
Leiurus quinquestriatus (death stalker scorpion) – very potent neurotoxin, one of the world's most dangerous scorpions (partly because stings usually occur at locations very remote from necessary supportive medical care). Causes mainly localized reactions, swelling & pain in >90% of stings, but kills several humans annually. Children most severely affected because severity of venom effects are weight-dependent.
Macrovipera lebetina (blunt-nosed viper) – venom mainly hemotoxic. Envenomation causes sharp pain at site of bite, followed by local swelling & necrosis. Numerous serious envenomations & deaths of humans reported each year.
Pseudocerastes persicus (Persian horned viper) – venom varies for different named subspecies, mainly hemotoxic, possibly w/ neurotoxic factors. Most bites to humans produce limited envenomation, w/ mainly local symptoms of minor pain, mild local tingling & stiffness. Serious envenomation can cause internal hemorrhaging, extensive progressive swelling, weakness & ptosis. Victim may be conscious but can't respond due to paralysis. Reports of human envenomation fairly common, but fatalities not very common.
Scorpio maurus (large-clawed scorpion) – relatively mild neurotoxic venom, w/ cytotoxic & hemotoxic factors. Envenomation usually causes moderate to severe local pain, sometimes limited local swelling & redness, which usually resolves in less than 24 hrs. w/ only symptomatic treatment.
Scorpio maurus palmatus (golden desert scorpion) – mildly neurotoxic, w/ cytotoxic & possibly hemotoxic factors; usually causes only local pain, slight swelling & redness at sting site. No human fatalities reported. Maurotoxin, a new type of toxin w/ 4 disulfide bridges, was first isolated from specimens of this subspecies from northern Africa (Tunisia). This represented a new class of natural biologic toxins which have since been extensively characterized & studied, mainly in European labs.
Walterinnesia aegyptia (desert cobra) – venom strongly neurotoxic, w/ some milder hemotoxic factors. Envenomation usually causes some combination of: local pain, swelling, fever, general weakness, headache, & vomiting. Human deaths from envenomations have been reported.

Short and Long-Term Health Risk. Since the occurrence of incidents is rare, the risk is Low.

Other

Conus textile (textile cone, marine snail) – potent neurotoxin, have up to 4 categories of conotoxins. Serious envenomations (sometimes fatal) usually occur when a swimmer (wader) picks up a shell w/ the live snail still inside. Human death is usually due to the venom blocking nerve signals to the heart &/or diaphragm, stopping blood flow &/or breathing. Symptoms usually include immediate local pain, tingling, difficulty speaking, slowed breathing, progressive hypotension, lethargy, & coma. Military operations at **AASAB** do not involve extensive water contact.

Short and Long-Term Health Risk. While the risk in Kuwait is Moderate (short-term), the risk to AASAB personnel is Low.

7. HEAT/COLD STRESS

Heat

Kuwait has a subtropical desert climate with two distinct seasons:

Summer (May through October) produces a maximum high temperature of 46ºC (115ºF) and a minimum low of 23ºC (73ºF), with a mean daily high temperature of 42ºC (108ºF) and a mean daily low temperature of 27ºC (81ºF). Diurnal temperatures can vary as much as 10ºC (18ºF). Frequent sandstorms caused by arid shamal winds blow across the Persian Gulf. Temperature extremes can increase the potential for heat related injuries, including dehydration, heat exhaustion, and heat stroke.
Winter (November through April) produces a maximum high temperature of 31ºC (88ºF) and a minimum low temperature of 8ºC (46ºF), with a mean daily high temperature of 23ºC (73ºF) and a mean daily low temperature of 12ºC (54ºF). Winter brings all of Kuwait's meager annual precipitation (5 to 28 millimeters; 0.2 to 1 inch), which sometimes is heavy enough to produce minor local flooding.

Short and Long-Term Health Risk. The short-term risk of heat injury is High in unacclimatized personnel. Risk is reduced to Moderate or Low through PM measures. Long term health implications from heat injury are rare but can occur – especially from more serious heat injuries such as heat stroke. It has also been considered possible that high heat in conjunction with various chemical exposures can increase long term health risks, though specific scientific evidence is not conclusive. The overall long-term risk though Low may be greater to certain susceptible persons – those older (>45), in lesser physical shape, or with underlying medical/health conditions.

Cold

Cold environments pose a threat to the individual if they exceed the capacity of the body's thermo-regulatory response mechanisms. The main hazards are ***hypothermia*** associated with a fall in the body's core temperature and/or ***tissue damage*** that falls under the broad headings of freezing cold injury (FCI) and non-freezing cold injury (NFCI).

Short and Long-Term Health Risk. The risk for tissue damage is LOW, and with PM measures, the risk of hypothermia is also Low.

8. NOISE

Continuous:

The flightline area is classified as a hazardous noise area when aircraft and aircraft generating equipment (AGE) is running. Personnel that work routinely around the aircraft engines and the auxiliary power unit (APU) on the C-17 aircraft wear double hearing protection. Other sources of continuous noise would be from shop equipment, generators, and certain motor vehicles and forklifts. Most hazardous noise equipment is properly marked with the appropriate warning. Workplace surveillance reports identify the proper hearing protection required for the hazardous noise equipment and have evaluated the hearing protection devices available offer adequate protection. Workplace specific noise can be found in DOEHRS-IH or in the DOEHRS data repository for specific shop information.

Short and Long-Term Health Risk: The risk is moderate, but reduced to low when wearing the proper hearing protection devices.

Impulse:

While some potential for impulse noise may be from shop equipment, most of the exposure is from weapons qualification training at the Udairi Range. Soundguard and Aero EAR disposable earplugs are available for use. Additionally, some personnel have the Combat Earplug.

Short and Long-Term Health Risk: The risk from impulse noise is Low.

9. OTHER UNIQUE OCCUPATIONAL HAZARDS

Pesticides

Much of the pest control at this site consists of trapping and small area treatment for ants, spiders, rodents, and beetles with baits, glue boxes, and pyrethroids. Larvicides (i.e., Agnique and/or Altosid Briquettes) are used for mosquito larval control. Some limited area residual pest control is performed to control mosquitoes. Personnel may have been incidentally exposed to very low levels of pesticide during pest control operations. Occasionally pest management will use PT565 aerosol for treatment of ants, but the primary control is bait stations.

Short and Long-Term Health Risks: Low

Asbestos/Lead-based Paint

There is no evidence of lead-based paint or asbestos in any facilities used by US personnel. Per discussion with the base environmental coordinator, host nation agreements do not allow the use of lead-based paint nor asbestos, therefore, all buildings are considered free of these materials. No sampling has been performed based on knowledge of no materials used.

Short and Long-Term Health Risks: Low

Waste Sites/Waste Disposal

Four sources of waste exist on base, medical, non-hazardous solid waste, hazardous industrial waste, and sanitary sewer/latrine waste. Base personnel have minimal contact with this waste and risk to any exposure is low. Hazardous medical waste (red-bagged) generated by the medical group is staged in an outdoor locked connex that is controlled by medical staff. The medical waste is delivered by medical technicians every-other week to camp Arifjan for incineration.

Non-hazardous solid waste generated by base residents is disposed of in various trash bins throughout the base. The trash bins are emptied through a host nation contractor. Office trash is collected and disposed of by the base janitorial contract personnel.

Currently, proper handling, storage, and disposal of industrial waste generated on base are coordinated at the unit level. Waste is turned in to the central short term storage hazardous material/waste satellite storage site which is managed by the base environmental coordinator (contract personnel). The waste is removed by host nation contract personnel.

The sanitary sewer is a plumbed system from all buildings on base. The sewage drains to a low-point holding tank. This tank is pumped out at least daily by contract personnel and is transported to the base sewage lagoon, affectionately known as “The Green Mile”. No U.S. personnel come into contact with the sewage or the lagoon. Chemical latrines are pumped out by trucks and waste is disposed off base by contract personnel. No specific health risks associated with these waste management operations have been identified.

Short and Long-Term Health Risks: Low

10. Unique Incidents/Concerns

POL Spills:

Numerous small POL spills occur throughout the installation from aviation fuel, diesel fuel, and hydraulic fluid. No direct exposure to skin has occurred. Direct reading instruments had petroleum hydrocarbon readings below 20 ppm. This primarily impacts the Fuels Management Flight (386 ELRS/LGRF) personnel who may be impacted in the performance of their duties and Fire & Emergency Services (386 ECES/CEF) personnel who may be impacted while responding to contain spills and mitigate soil contamination.

Short and Long-Term Health Risk: Low

***Security Forces Training Area*:**

Six Samples were collected in December 2008 in a new Security Forces training area. These samples are not applicable to the general population. Samples were analyzed for metals/inorganics as well as organics. All contaminants were below the MEGs.

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

Long-Term Health Risk: All contaminants measured at concentrations below MEGs. Confidence in this assessment is medium.