DEPARTMENT OF THE ARMY
US ARMY PUBLIC HEALTH COMMAND (PROVISIONAL)
5158 BLACKHAWK ROAD
ABERDEEN PROVING GROUND MD 21010-5403

MCHB-TS-RDE

29 APR 2010

MEMORANDUM FOR Office of the Command Surgeon (LTC (b) (6)), US Central Command, 7115 South Boundary Boulevard, MacDill Air Force Base, FL 33621-5101

SUBJECT: Deployment Occupational and Environmental Health Risk Characterization, Ambient Air Particulate Matter Samples, Speicher, Iraq, 19-21 October 2009, U_IRQ_SPEICHER_CM_A10_20091021

1. The enclosed assessment details the occupational and environmental health (OEH) risk characterization for ambient air particulate matter (PM) samples collected by 223rd Medical Detachment personnel, Speicher, Iraq, 19-21 October 2009. All three filters submitted are valid samples.

2. The OEH risk estimate for exposure to PM less than 10 micrometers in diameter (PM_{10}) and metals in the ambient air at Speicher, Iraq on the sampled dates is **low**. Degraded unit readiness from exposure to the ambient air during this sampling event is not expected; periods with similar ambient conditions are expected to cause few, if any, health effects.

FOR THE COMMANDER:

(b) (6)
Director, Health Risk Management

Encl

CF: (w/encl)
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(CONT)

MCHB-TS-RDE
SUBJECT: Deployment Occupational and Environmental Health Risk Characterization, Ambient Air Particulate Matter Samples, Speicher, Iraq, 19-21 October 2009, U_IRQ_SPEICHER_CM_A10_20091021

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U.S. Army Public Health Command
(Provisional)

USAPHC

DEPLOYMENT OCCUPATIONAL AND ENVIRONMENTAL
HEALTH RISK CHARACTERIZATION
AMBIENT AIR PARTICULATE MATTER SAMPLES
SPEICHER, IRAQ
19-21 OCTOBER 2009
U_IRQ_SPEICHER_CM_A10_20091021

Preventive Medicine Survey: 40-5f1

DEPLOYMENT OCCUPATIONAL AND ENVIRONMENTAL
HEALTH RISK CHARACTERIZATION
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19-21 OCTOBER 2009
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1. REFERENCES. See Appendix A for a list of references.

2. PURPOSE AND SCOPE. This occupational and environmental health (OEH) risk characterization addresses the analytical results for particulate matter (PM) less than 10 micrometers in diameter (PM_{10}) and metals ambient air samples collected on 19-21 October 2009 at Speicher, Iraq in accordance with U.S. Department of Defense medical surveillance requirements. All three filters submitted are valid samples. This sample set was assessed using the methodology described in Appendix B. This report should not be considered a complete assessment of the overall OEH hazards to which troops may be exposed at Speicher, Iraq.

3. BACKGROUND AND EXPOSURE ASSUMPTIONS. Ambient air PM_{10} and metals samples were collected at the burn pit/Defense Reutilization and Marketing Office, Speicher, Iraq, 19-21 October 2009. Soldiers are exposed to fumes from the burn pit where they eat, sleep, and work on a daily basis. There is no known industry present in the vicinity. No weather conditions were reported for the sampling event. All personnel are expected to remain at this location for greater than 1 year. A conservative (protective) assumption is that all personnel inhale the ambient air for 24 hours/day for 365 days (1 year). In addition, it is assumed that control measures and/or personal protective equipment are not used.

4. SAMPLE COLLECTION AND ANALYSIS.

a. Sample Collection. This ambient air PM_{10} and metals sample set was collected using the Deployment Particulate Sampler (DPS™) apparatus. Table 1 presents a summary of the PM filters submitted by the unit. (DPS™ is a trademark of SKC, Inc.)

Table 1. Sample Summary Ambient Air PM Samples, Speicher, Iraq,
19-21 October 2009

Sample Identification		Date	Valid/Reason
Field ID	Site		
IRA_SPEICH_PM10DPS_09292_01	Burn pit/DRMO	19 October 2009	Yes
IRA_SPEICH_PM10DPS_09293_01	Burn pit/DRMO	20 October 2009	Yes
IRA_SPEICH_PM10DPS_09294_01	Burn pit/DRMO	21 October 2009	Yes

LEGEND:
DRMO = Defense Reutilization and Marketing Office

b. Laboratory Analysis. The U.S. Army Public Health Command (Provisional) (USAPHC (Prov)), formerly U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM), weighs the ambient air PM filters to determine PM mass and calculate a concentration. The USAPHC (Prov)-Headquarters laboratory analyzes the filters to determine metals concentrations. Detected metals identified above the laboratory reportable limit were compared to MEGs presented in USACHPPM TG 230, while PM_{10} concentrations were assessed using the process described in the methodology section, Appendix B. Appendix C shows an information summary of the filters assessed in this report. Appendix D shows a sample results summary table. Appendix E shows complete analytical results.

5. HAZARD IDENTIFICATION.

a. The PM. Since PM was measured at a concentration above the Air Quality Index good range, PM is identified as a potential health threat requiring further assessment. The PM air pollutants include solid particles and liquid droplets, emitted directly into the air by sources, such as, power plants, motor vehicles, aircraft, generators, construction activities, fires, and natural windblown dust. The PM can include dust, silica, soil, metals, organic compounds, allergens, and compounds, such as, nitrates or sulfates that are formed by condensation or transformation of combustion exhaust. The PM chemical composition and size vary considerably depending on the source.

b. Metals. No detected metals were found at concentrations greater than their respective MEGs. Therefore, the OEH risk estimate for exposure to metals in the ambient air at this location is considered **low**.

6. HAZARD ASSESSMENT.

a. Hazard Severity. The average concentration of PM_{10} was 108.07 micrograms per cubic meter ($\mu g/m^3$). This concentration falls within the range of concentrations that

are believed to pose significant health concerns to susceptible groups, which in the military can include asthmatics or persons with pre-existing cardiopulmonary disease. Otherwise, generally healthy troops may have some eye, nasal, or throat irritation causing little or no impact on unit readiness. Therefore, the hazard severity is considered negligible.

b. Hazard Probability. When less than four samples were collected/number of days sampled are received for risk characterization, a hazard probability is not estimated; the hazard severity determines the risk estimate. A negligible severity represents a low risk and a marginal severity represents a moderate risk. Since the hazard severity was estimated to be negligible and three samples were collected, the risk from exposure to PM_{10} during the sampling event is assumed to be **low**.

c. Risk Estimate and Confidence. Table 2 summarizes the risk estimate for each identified hazard.

Table 2. Risk Estimate Summary for Exposure to PM_{10} in the Ambient Air, Speicher, Iraq, 19-21 October 2009

Parameter	Hazard Severity	Hazard Probability	Hazard-Specific Risk Estimate	Operational Risk Estimate	Confidence
PM_{10}	Negligible	N/A	LOW	LOW	LOW
Metals	No parameters detected above a MEG		LOW		

LEGEND:
N/A = not applicable; hazard probability not estimated when < four samples received for risk characterization.

7. CONCLUSION. The OEH risk estimate for exposure to PM_{10} in the ambient air at Speicher, Iraq, 19-21 October 2009 is **low**. Degraded unit readiness from exposure to the ambient air during this sampling event is not expected; periods with similar ambient conditions are expected to cause few, if any, health effects.

8. RECOMMENDATIONS AND NOTES.

a. Recommendations.

(1) Collect PM samples from Speicher, Iraq at least once every 6 days (if possible) for the deployment duration (or as long as possible) to better characterize the ambient air PM and metals exposures.

(2) Restrict outdoor physical activities where possible during periods of visibly high particulate levels.

b. Notes.

(1) This OEH risk assessment is specific to the exposure assumptions identified above and the sample results assessed in this report. If the assumed exposure scenario changes or additional information is available, provide the updated information so that the risk estimate can be reassessed. If additional samples from this site and/or area are collected, a new OEH risk assessment will be completed.

(2) As part of a Comprehensive Military Medical Surveillance Program, required by Department of Defense Directive 6490.02E and Department of Defense Instruction 6490.03, this report has been submitted to the Deployment Occupational and Environmental Health Surveillance (DOEHS)-Data Portal. You can view this and other archived DOEHS data at https://doehrswww.apgea.army.mil/doehrs-oehs/. If you have additional DOEHS data for Speicher, Iraq it can also be submitted via this Web site.

9. POINTS OF CONTACT. The USAPHC (Prov) points of contact for this assessment are Mrs. (b) (6) and Mr. (b) (6). Mrs. (b) (6) may be contacted at e-mail (b) (6); Mr. (b) (6) may be contacted at e-mail (b) (6) or DSN (b) (6) or commercial (b) (6).

(b) (6)

Environmental Scientist
Deployment Environmental Surveillance Program

Approved by:

(b) (6)

MAJ, MS
Program Manager
Deployment Environmental Surveillance

APPENDIX A

REFERENCES

1. Department of Defense Directive (DODD) 6490.02E, Comprehensive Health Surveillance, 21 October 2004.

2. Department of Defense Instruction (DODI) 6490.03, Deployment Health, 11 August 2006.

3. Department of the Army (DA), Field Manual (FM) 5-19, Composite Risk Management, 21 August 2006.

4. DA, Technical Bulletin, Medical (TB MED) 577, Sanitary Control and Surveillance of Field Water Supplies, 15 November 2005.

5. U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) Technical Guide (TG) 230, Chemical Exposure Guidelines for Deployed Military Personnel, Version 1.3, May 2003 with the January 2004 addendum

6. USACHPPM Reference Document (RD) 230, Chemical Exposure Guidelines for Deployed Military Personnel, Version 1.3, May 2003 with January 2004 addendum.

7. Memorandum, USACHPPM (MCHB-TS-RDE), 27 April 2007, Subject: Deployment Operational Risk Characterization Method for Particulate Matter (PM).

APPENDIX B

METHODOLOGY

B-1. SCOPE OF RISK ASSESSMENTS. The U.S. Army Public Health Command (Provisional (USAPHC (Prov)), formerly U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM), Deployment Environmental Surveillance Program characterizes deployment occupational and environmental health (OEH) risks which may impact mission capability (that is, operational risks). Each characterization is performed using risk management doctrine (Field Manual (FM) 5-19), and the relatively conservative (protective) assumptions and methods provided in the USACHPPM Technical Guide (TG) 230, to facilitate decision making that can minimize the likelihood of significant risks. A risk estimate is generated for each sample or sample set sent to the USAPHC (Prov) laboratory for analysis. These risk estimates are provided to preventive medicine personnel with information about potential operational risks and associated health effects. The samples received are generally limited in time, area, and media. Therefore, any risk characterization based on a sample or sample set should not be considered a complete characterization of the overall OEH hazards to which troops may be exposed at a location.

B-2. RISK ASSESSMENT METHODOLOGY.

a. General. USACHPPM TG 230 methodology (identification of the hazard(s), assessment of the hazard severity and probability, and determination of a risk estimate and confidence level) with the USACHPPM TG 230 military exposure guidelines (MEGs) and Technical Bulletin, Medical (TB MED) 577 standards are used to characterize the risk from identified OEH hazards. Each component of the methodology is described in more detail below.

b. Hazard Identification.

(1) Hazard Definition. For the purpose of conducting these risk assessments, an OEH hazard is any biological, chemical, or physical parameter detected in a medium, by field testing or laboratory analysis. The detected parameter could pose a health threat if personnel are exposed to it at levels greater than its respective MEG.

(2) Screening the Hazards.

a. General. The USAPHC (Prov) DESP uses the USACHPPM TG 230 methodology as expanded in reference 5 and associated MEGs to assess identified hazards and estimate risk in a manner consistent with doctrinal risk management procedures and

terminology. This method includes identification of the hazard(s), assessment of the hazard severity and probability, and determination of a risk estimate and associated level of confidence. As part of the hazard identification step, the long-term (1-year) MEGs are used as screening criteria to identify those hazards that are potential health threats. These 1-year MEGs represent exposure concentrations at or below which no significant health effects (including delayed or chronic disease or significant increased risk of cancer) are anticipated even after 1 year of continuous daily exposures. Short-term MEGs are used to assess brief one time or intermittent exposures. The underlying toxicological basis for the MEGs is addressed in USACHPPM Reference Document (RD) 230. Since toxicological information about potential health effects varies among different chemicals, the determination of severity of effects when MEGs are exceeded involves professional judgment. Hazards with exposure concentrations greater than MEGs are identified as potential health threats, carried through the hazard assessment process, and assigned a risk estimate consistent with operational risk management methodology. Hazards that are either not detected or are present only at levels below the 1-year MEGs are not considered health threats; therefore, are automatically assigned a low operational risk estimate.

b. Assessment of Ambient Air Particulate Matter. The particulate matter (PM) is one of six air pollutants for which the U.S. Environmental Protection Agency (USEPA) has promulgated National Ambient Air Quality Standards in the interest of protecting public health. In addition, the USEPA developed the Air Quality Index (AQI) to communicate daily air quality to the public using six descriptive categories ranging from “good” to “hazardous.” The AQI categories for PM are based on concentration ranges that are grouped according to the severity of health concerns. The USAPHC (Prov) uses the AQI categories to characterize the operational risk from PM. If any PM sample concentration is above the threshold of the AQI good quality air category, it is identified as a hazard. Hazard severity is determined by comparing the average PM concentration for a specific location and timeframe to PM concentration ranges identified as either negligible or marginal. Negligible concentration levels correspond to mild respiratory effects among generally healthy troops, with more significant effects among sensitive persons, such as, asthmatics or those with existing cardiopulmonary disease. Marginal concentration levels are expected to pose more significant health effects among both healthy personnel, and those with preexisting sensitivities. Hazard probability is based on the frequency that anticipated exposures are above a threshold that is representative of the hazard severity category.

APPENDIX C

INFORMATION SUMMARY
AMBIENT AIR SAMPLE
SPEICHER, IRAQ
19-21 OCTOBER 2009

DOEHRS Sample ID	Field/Local Sample ID	Site	Start Date/Time	Sample Duration	Filter ID
00001FCL	IRA_SPEICH_PM10DPS_09292_01	Burn Pit/ DRMO	2009/10/19 1108	1440.0 minutes	47-08-1024
00001FCM	IRA_SPEICH_PM10DPS_09293_01	Burn Pit/ DRMO	2009/10/20 1200	1440.0 minutes	47-08-1846
00001FCN	IRA_SPEICH_PM10DPS_09294_01	Burn Pit/ DRMO	2009/10/21 1208	1440.0 minutes	47-08-1845

LEGEND:
DOEHRS Sample ID=Deployment Occupational and Environmental Health Readiness System Sample Identification Number
DRMO = Defense Reutilization and Marketing Office

APPENDIX D

RESULTS SUMMARY
AMBIENT AIR SAMPLE
SPEICHER, IRAQ
19-21 OCTOBER 2009

Parameter[1]	Units	Concentration		Valid Samples		USACHPPM TG 230 Military Exposure Guidelines	
						1 year	
		Maximum	Average	#	# > Laboratory Reporting Limit	# > MEG	MEG
PM_{10}	$\mu g/m^3$	138	108	3	3	3	50

[1] Highlighted values indicate the parameter was detected at a concentration above a MEG

LEGEND:
$\mu g/m^3$ = micrograms per cubic meter

APPENDIX E

ANALYTICAL SAMPLE RESULTS
AMBIENT AIR SAMPLE
SPEICHER, IRAQ
19-21 OCTOBER 2009

DOEHRS Sample ID			00001FCL	00001FCM	00001FCN
Field/Local Sample ID			IRA_SPEICH_ PM10DPS_09292_01	IRA_SPEICH_ PM10DPS_09293_01	IRA_SPEICH_ PM10DPS_09293_01
Site			Burn Pit/DRMO	Burn Pit/DRMO	Burn Pit/DRMO
Start Date/Time			2009/10/19 1108	2009/10/20 1200	2009/10/21 1208
Parameter	Class	Units	Concentration[1,2]		
Antimony	Metals	µg/m^3	< 0.068757	< 0.069793	< 0.070502
Arsenic	Metals	µg/m^3	< 0.034378	< 0.034897	< 0.035251
Beryllium	Metals	µg/m^3	< 0.034378	< 0.034897	< 0.035251
Cadmium	Metals	µg/m^3	< 0.034378	< 0.034897	< 0.035251
Chromium	Metals	µg/m^3	< 0.034378	< 0.034897	< 0.035251
Lead	Metals	µg/m^3	< 0.068757	< 0.069793	< 0.070502
Manganese	Metals	µg/m^3	< 0.13751	< 0.13959	< 0.14100
Nickel	Metals	µg/m^3	< 0.034378	< 0.034897	< 0.035251
PM_{10}		µg/m^3	101.83	84.101	138.29
Vanadium	Metals	µg/m^3	< 0.13751	< 0.13959	< 0.14100
Zinc	Metals	µg/m^3	< 0.34378	< 0.34897	< 0.35251

[1]< X.XX = Below laboratory reporting limit (X.XX)
[2]Laboratory reporting limit is parameter and sample specific

LEGEND:
DOEHRS Sample ID = Deployment Occupational and Environmental Health Readiness System Sample Identification Number
DRMO = Defense Reutilization and Marketing Office
µg/m^3 = micrograms per cubic meter