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US ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE
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28 MAY 2009

MCHB-TS-RDE

MEMORANDUM FOR Command Surgeon (MAJ (b) (6)), U.S. 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, Delta, Iraq, 15 January–13 February 2009, U_IRQ_DELTA_CM_A10_20090213

1. The enclosed assessment details the occupational and environmental health (OEH) risk characterization for 10 ambient air particulate matter samples collected by 485th Medical Detachment personnel, Delta, Iraq, 15 January–13 February 2009. One of the 10 filters submitted was a valid sample.
2. The OEH risk estimate for exposure to particulate matter less than 10 micrometers in diameter (PM₁₀) and the analyzed metals in the ambient air at the burn pit, Delta, Iraq on 13 February 2009 is **low**. Exposure to these parameters in the ambient air is expected to have little to no impact on unit readiness.

FOR THE COMMANDER:

(b) (6)

Encl

Director, Health Risk Management

MCHB-TS-RDE

SUBJECT: Deployment Occupational and Environmental Health Risk Characterization,
Ambient Air Particulate Matter Samples, Delta, Iraq, 15 January–13 February 2009,
U_IRQ_DELTA_CM_A10_20090213

CF: (w/encl)

485th MED DET PM (Commander/CPT (b) (6))

485th MED DET PM (CPT (b) (6))

485th MED DET PM (SSG (b) (6))

27th BSB, 4th BCT, 1CD (SGT (b) (6))

MNC-I (Command Surgeon/LTC (b) (6))

MNF-I CJ148 (Commander/CDR (b) (6))

ARCENT (Command Surgeon/LTC (b) (6))

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44th MEDCOM (Environmental Science Officer/SFC (b) (6))

44th MEDCOM (Environmental Science Officer/MSG (b) (6))

44th MEDCOM (Environmental Science Officer/CPT (b) (6))

44th MEDCOM (Preventive Medicine Officer/MAJ (b) (6))

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USACHPPM-EUR (MCHB-AE-EE/CPT (b) (6))

U.S. Army Center for Health Promotion and Preventive Medicine



DEPLOYMENT OCCUPATIONAL AND ENVIRONMENTAL
HEALTH RISK CHARACTERIZATION
AMBIENT AIR PARTICULATE MATTER SAMPLES
DELTA, IRAQ
15 JANUARY–13 FEBRUARY 2009
U_IRQ_DELTA_CM_A10_20090213

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Preventive Medicine Survey: 40-5f1

CHPPMFORM 433-E (MCHB-CS-IPD), OCT 03

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DEPLOYMENT OCCUPATIONAL AND ENVIRONMENTAL
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U_IRQ_DELTA_CM_A10_20090213

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 less than 10 micrometers in diameter (PM₁₀) and metals ambient air samples collected on 15 January–13 February 2009 at Delta, Iraq in accordance with U.S. Department of Defense (DOD) medical surveillance requirements. One of the 10 filters submitted was a valid sample. 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 this location.

3. BACKGROUND AND EXPOSURE ASSUMPTIONS. Ambient air PM₁₀ and metals samples were collected at the burn pit and medical treatment facility (MTF), Delta, Iraq, 15 January–13 February 2009. 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 approximately 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 PM₁₀ and metals sample set was collected using the Mini-VolTM apparatus. Table 1 presents a summary of the PM filters submitted by the unit. (Mini-VolTM is a registered trademark of Airmetrics, Inc.)

Table 1. Sample Summary Ambient Air PM Samples, Delta, Iraq, 15 January–13 February 2009

Sample Site	Dates Sampled	Type of Sample	Number Collected	Number Valid	Number Invalid
The Burn Pit	15 Jan-13 Feb 09	PM ₁₀	5	1	4
MTF	15 Jan-13 Feb 09	PM ₁₀	5	0	5
Totals	15 Jan-13 Feb 09	PM₁₀	10	1	9

Use of trademarked names(s) does not imply endorsement by the U.S. Army but is intended only to assist in the identifications of a specific product.

b. Laboratory Analysis. The U.S. Army Center for Health Promotion and Preventive Medicine-Headquarters weighs the ambient air PM filters to determine PM mass and calculate a concentration. The USACHPPM-Headquarter laboratory analyzes the filters to determine metals concentrations. Appendix C shows a 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 Particulate Matter PM. Since PM was measured at a concentration above the Air Quality Index (AQI) 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. Primary sources of PM at the specified location are assumed to be windblown dust and sand.

b. Metals. No detected metals were found at concentrations greater than their respective military exposure guidelines (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 concentration of PM₁₀ was 168 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$). 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 valid daily samples are collected and 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 one valid sample was collected, the risk from exposure during the sampling event is assumed to be **low**.

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

Table 2. Risk Estimate Summary for Exposure to PM₁₀ in the Ambient Air, Delta, Iraq, 15 January–13 February 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		

7. **CONCLUSION.** The OEH risk estimate for exposure to PM₁₀ and the analyzed metals in the ambient air at the burn pit, Delta, Iraq, 13 February 2009 is **low**. Exposure to these parameters in the ambient air is expected to have little to no impact on unit readiness.

8. **RECOMMENDATIONS AND NOTES.**

a. Recommendations.

(1) Consider refresher training on particulate matter sample collection using the MiniVol™ apparatus in order to increase the number of valid samples and improve the data used to estimate the OEH risk.

(2) Consider collecting PM less than 2.5 micrometers in diameter (PM_{2.5}) as well as PM₁₀ samples from this location at least once every 6 days (if possible) for the deployment duration (or as long as possible) to better characterize the PM and metals ambient air concentrations to which personnel are typically exposed.

(3) 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 (DOD-D) 6490.02E and Department of Defense Instruction (DOD-I) 6490.03, this report has been submitted to the Deployment Occupational and Environmental Health Surveillance - Data Portal (DOEHS-DP). You can view this and other

Deployment OEH Risk Characterization, Ambient Air PM Samples, Delta, Iraq, 1
5 Jan-13 Feb 09, U_IRQ_DELTA_CM_A10_20090213

archived DOEHS data at <https://doehrswww.apgea.army.mil/doehrs-oehs/>. If you have additional DOEHS data for this location it can also be submitted via this Web site.

9. POINTS OF CONTACT. The USACHPPM points of contact for this assessment are Mr. (b) (6) and Mr. (b) (6). Mr. (b) (6) may be contacted at e-mail (b) (6) and 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

Deployment OEH Risk Characterization, Ambient Air PM Samples, Delta, Iraq,
15 Jan–13 Feb 09, U_IRQ_DELTA_CM_A10_20090213

APPENDIX A

REFERENCES

1. DOD-D 6490.02E, Comprehensive Health Surveillance, 21 October 2004.
2. DOD-I 6490.03, Deployment Health, 11 August 2006.
3. Field Manual (FM) 5–19, Composite Risk Management, 21 August 2006.
4. USACHPPM Technical Guide (TG) 230, Chemical Exposure Guidelines for Deployed Military Personnel, Version 1.3, May 2003 with the January 2004 addendum.
5. 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 USACHPPM Deployment Environmental Surveillance Program characterizes deployment OEH risks which may impact mission capability (that is, operational risks). Each characterization is performed using risk management doctrine (FM 5–19), and the relatively conservative (protective) assumptions and methods provided in the USACHPPM 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 USACHPPM-Headquarters 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 MEGs and 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 USACHPPM Deployment Environmental Surveillance Program uses the TG 230 methodology as expanded in Reference (1d.) 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 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 ORM 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 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 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 USACHPPM 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.

Deployment OEH Risk Characterization, Ambient Air PM Samples, Delta, Iraq, 15 Jan–13 Feb 09,
 U_IRQ_DELTA_CM_A10_20090213

APPENDIX C

INFORMATION SUMMARY
 AMBIENT AIR PARTICULATE MATTER SAMPLES
 DELTA, IRAQ
 15 JANUARY–13 FEBRUARY 2009

Sample ID	Field/Local Sample ID	Location	Start Date/Time	Sample Time	Invalid Sample	Invalid Reason	Filter ID
00000Q1P	IRQ_DELTA_09044_PM10MV	DELTA	2009/02/13 1020	1446.0 min	No		47-08-2559
	IRQ_DELTA_09044_PM10MV	DELTA	2009/02/13 1228	540.0 min	Yes	Battery failure	47-08-2558
	IRQ_DELTA_09030_PM10MV	DELTA	2009/01/30 0945	0	Yes	Missing field data	47-08-0373
	IRQ_DELTA_09037_PM10MV	DELTA	2009/02/06 1130	0	Yes	Missing field data	47-08-0371
	IRQ_DELTA_09037_PM10MV	DELTA	2009/02/06 1130	0	Yes	Missing field data	47-08-0372
	IRQ_DELTA_09030_PM10MV	DELTA	2009/01/30 1130	0	Yes	Missing field data	47-08-0374
	IRQ_DELTA_09015_PM10MV	DELTA	2009/01/15 1010	0	Yes	Missing field data	47-08-2554
	IRQ_DELTA_09015_PM10MV	DELTA	2009/01/15 0930	0	Yes	Missing field data	47-08-2553
	IRQ_DELTA_09023_PM10MV	DELTA	2009/02/23 1340	0	Yes	Missing field data	47-08-2552
	IRQ_DELTA_09023_PM10MV	DELTA	2009/02/23 1400	0	Yes	Missing field data	47-08-2551

Deployment OEH Risk Characterization, Ambient Air PM Samples, Delta, Iraq, 15 Jan–13 Feb 09,
 U_IRQ_DELTA_CM_A10_20090213

APPENDIX D

RESULTS SUMMARY
 AMBIENT AIR PARTICULATE MATTER SAMPLES
 BURN PIT, DELTA, IRAQ
 13 FEBRUARY 2009

Parameter detected above laboratory limit	Units	Concentration	Samples (Valid)	USACHPPM TG230 Military Exposure Guidelines 1 year	
			#	# > MEG	MEG
PM 10	$\mu\text{g}/\text{m}^3$	168	1	1	50

Deployment OEH Risk Characterization, Ambient Air PM Samples, Delta, Iraq, 15 Jan–13 Feb 09,
 U_IRQ_DELTA_CM_A10_20090213

APPENDIX E

ANALYTICAL SAMPLE RESULTS
 AMBIENT AIR PARTICULATE MATTER SAMPLES
 BURN PIT, DELTA, IRAQ
 13 FEBRUARY 2009

Sample ID				00000Q1P
Field/Local Sample ID				IRQ_DELTA_09044_PM10MV
Country				Iraq
Location				DELTA
Start Date				2009/02/13 1020
Analyte	CAS	Class	Units	Results
Antimony	7440-36-0	Metals	$\mu\text{g}/\text{m}^3$	< 0.13773
Arsenic	7440-38-2	Metals	$\mu\text{g}/\text{m}^3$	< 0.068865
Beryllium	7440-41-7	Metals	$\mu\text{g}/\text{m}^3$	< 0.068865
Cadmium	7440-43-9	Metals	$\mu\text{g}/\text{m}^3$	< 0.068865
Chromium	7440-47-3	Metals	$\mu\text{g}/\text{m}^3$	< 0.068865
Lead	7439-92-1	Metals	$\mu\text{g}/\text{m}^3$	< 0.13773
Manganese	7439-96-5	Metals	$\mu\text{g}/\text{m}^3$	< 0.27546
Nickel	7440-02-0	Metals	$\mu\text{g}/\text{m}^3$	< 0.068865
PM 10			$\mu\text{g}/\text{m}^3$	168
Vanadium	7440-62-2	Metals	$\mu\text{g}/\text{m}^3$	< 0.27546
Zinc	7440-66-6	Metals	$\mu\text{g}/\text{m}^3$	< 0.68865