DEPARTMENT OF THE ARMY
US ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE
5158 BLACKHAWK ROAD
ABERDEEN PROVING GROUND MD 21010-5403

MCHB-TS-RDE

26 SEP 2009

MEMORANDUM FOR Office of the Command Surgeon (MAJ (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 Volatile Organic Compound Samples, Balad, Iraq, 27 July 2009, U_IRQ_BALAD_CM_A17_20090727

1. The enclosed report details the occupational and environmental health (OEH) risk characterization for four valid ambient air volatile organic compound (VOC) samples collected by 223rd Medical Detachment personnel from Balad, Iraq, 27 July 2009. Two additional samples were invalid due to discrepancies in sampler flow rates.

2. None of the VOCs detected in the samples were present at concentrations greater than their respective military exposure guidelines. The OEH risk estimate for exposure to VOCs in the ambient air around Catfish Air Terminal and burn pit at Balad, Iraq 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)
223rd MED DET (Commander/CPT (b) (6)
223rd MED DET (Detachment Sergeant/SFC (b) (6)
223rd MED DET (XO/CPT (b) (6)
111th MMB (FHP OIC Clinic Ops/1LT (b) (6)
332 EMDG/BEE (AF PM/Balad AB)
MNC-I (Command Surgeon Office/LTC (b) (6)
MNF-I CJ148 (Commander/CDR (b) (6)
ARCENT (Command Surgeon Office/LTC (b) (6)
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1st MED BDE (Environmental Science Officer/MSG (b) (6)
(CONT)

MCHB-TS-RDE
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CF: (w/encl) (CONT)
1st MED BDE (Environmental Science Officer/CPT (b) (6)
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U.S. Army Center for Health Promotion and Preventive Medicine

DEPLOYMENT OCCUPATIONAL AND ENVIRONMENTAL
HEALTH RISK CHARACTERIZATION
AMBIENT AIR VOLATILE ORGANIC COMPOUND SAMPLES
BALAD, IRAQ
27 JULY 2009
U_IRQ_BALAD_CM_A17_20090727

Preventive Medicine Survey: 40-5f1

USCHPPM

Readiness Thru Health

DEPLOYMENT OCCUPATIONAL AND ENVIRONMENTAL
HEALTH RISK CHARACTERIZATION
AMBIENT AIR VOLATILE ORGANIC COMPOUND SAMPLES
BALAD, IRAQ
27 JULY 2009
U_IRQ_BALAD_CM_A17_20090727

1. REFERENCES.

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

b. 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.

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

2. PURPOSE. According to U.S. Department of Defense medical surveillance requirements, this occupational and environmental health (OEH) risk characterization documents the identification and assessment of chemical hazards that pose potential health and operational risks to deployed troops. Specifically, the samples and information provided on the associated field data sheets were used to estimate the operational health risk associated with exposure to identified chemical hazards in the air at Balad, Iraq.

3. SCOPE. This assessment addresses the analytical results of six valid ambient air volatile organic compound (VOCs) samples collected from Balad, Iraq, 20-21 November 2008. These samples are limited in time, area, and media. Therefore, this report should not be considered a complete assessment of the overall OEH hazards to which troops may be exposed at this location. However, this assessment has been performed using operational risk management (ORM) doctrine FM 5-19 and the relatively conservative (protective) assumptions and methods provided in TG 230 to facilitate decision making that can minimize the likelihood of significant risks.

4. BACKGROUND AND EXPOSURE ASSUMPTIONS. The samples were collected to assess the potential for adverse health effects to troops routinely and continuously breathing the ambient air at Balad, Iraq. Two samples were collected outside Catfish Air Terminal and two samples were collected near the burn pit at Balad, Iraq. Both collection sites are located in areas near dining and living facilities. Field notes indicated airborne dust resulting from construction in burn pit, and exhaust and dust resulting from air craft in the air terminal area. It is expected that up to 75 percent of the personnel will be exposed to the ambient air for deployment durations of approximately 1 year. No adverse weather conditions or active industry were

reported in the surrounding area during sample collection. In addition, it is assumed that control measures and/or personal protective equipment are not used.

5. METHOD. The USACHPPM Deployment Environmental Surveillance Program uses the TG 230 methodology and associated military exposure guidelines (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 one time or intermittent exposures. The underlying toxicological basis for the MEGs is addressed in the 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 not detected or are present only at levels below the 1-year MEGs are not considered health threats and, therefore, are automatically assigned a low operational risk estimate.

6. HAZARD IDENTIFICATION.

a. Sample Information. Four ambient air VOC samples collected with the Deployment Volatile Sampler were submitted for analysis. The four samples and the two field blanks were collected on 27 July 2009. Two additional samples were invalid due to discrepancies in pre- and post-sample flow rates.

b. Laboratory Analysis. The four valid samples and two field blanks were analyzed by the USACHPPM-Headquarters laboratory for VOCs. Concentrations of VOCs detected above the laboratory reporting limit were compared to MEGs presented in TG 230. Appendix A provides a summary of the samples assessed in this report. Appendix B contains a summary of the sample results. Appendix C presents detailed laboratory results.

c. Risk Estimate. None of the VOCs detected in the samples were present at concentrations greater than their respective MEGs. Therefore, no potential health threats were identified and the risk estimate for exposure to VOCs in the ambient air is considered **low**.

7. CONCLUSION. The OEH risk estimate for exposure to VOCs in the ambient air around Catfish Air Terminal and burn pit area at Balad, Iraq is **low**. Exposure to VOCs in the ambient

air at the sample sites is expected to have little or no impact on unit readiness. Using TG 230, Table 3-5 as a guide, confidence in the risk estimate is considered **low**. In general, the confidence level in risk estimates is usually low to medium due to consistent lack of specific exposure information associated with troop movement and activity patterns; other routes/sources of potential OEH hazards not identified; and uncertainty regarding impacts of multiple chemicals present, particularly those affecting the same body organs/systems.

8. RECOMMENDATION AND NOTE.

a. Recommendation. Continue to collect samples from Balad, Iraq at least once every six days for the deployment duration (or as long as possible) to better characterize VOC concentrations in the ambient air to which personnel are typically exposed, and to increase confidence in risk estimates at Balad, Iraq.

b. Note. 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, provide updated information so that the risk estimate can be reassessed. If additional samples from this location are collected, a new OEH risk assessment will be completed.

9. POINTS OF CONTACT. The USACHPPM points of contact for this assessment are Ms. (b) (6) and Mr. (b) (6). Ms. (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

APPENDIX A

INFORMATION SUMMARY
AMBIENT AIR VOLATILE ORGANIC COMPOUND SAMPLES
BALAD, IRAQ
27 JULY 2009

DOEHRS Sample ID	Field/Local Sample ID	Site	Start Date/Time	Exposure Notes	Sample Duration	Invalid Sample	Sample Tube ID
000012AR	IRA_JOINTB_09208_ TO17-1	Catfish Air Terminal	2009/07/27 0450	Housing and dining facility where Soldiers eat and live on a daily basis.	486.0 minutes	No	C5792,C5627
000012AU	IRA_JOINTB_09208_ TO17-2	Burn Pit	2009/07/27 0510	Soldiers exposed on a daily basis due to activity centers, living and eating areas.	489.0 minutes	No	C3682,C5681
000012B2	IRA_JOINTB_09208_ O17-6	Burn Pit	2009/07/27 2128	Soldiers exposed on a daily basis due to activity centers, living and eating areas.	475.0 minutes	No	C3973,C5681
000012B6	IRA_JOINTB_09208_ TO17-4	Burn Pit	2009/07/27 1320	Soldiers exposed on a daily basis due to activity centers, living and eating centers.	484.0 minutes	Flow Differential	C5666,C5681
000012B8	IRA_JOINTB_09208_ TO17-3	Catfish Air Terminal	2009/07/27 1257	Soldiers exposed on a daily basis due to activity centers, living and eating areas.	477.0 minutes	Flow Differential	C5654,C5627
000012BD	IRA_JOINTB_09208_ TO17-5	Catfish Air Terminal	2009/07/27 2058	Housing and dining facility where Soldiers eat and live on daily basis.	477.0 minutes	No	C5680,C5627

LEGEND:
DOEHRS Sample ID = Deployment Occupational and Environmental Health Readiness System Sample Identification Number

APPENDIX B

RESULTS SUMMARY
AMBIENT AIR VOLATILE ORGANIC COMPOUND SAMPLES
BALAD, IRAQ
27 JULY 2009

Parameter	Units	Concentration[1]		Valid Samples		USACHPPM TG230 Military Exposure Guidelines (MEGs) 1year	
		Maximum	Average	#	# > Laboratory Reporting Limit	# > MEG	MEG
Benzene	µg/m^3	2.7327	0.94374	4	2	0	39
Cyclopentane	µg/m^3	0.73574	0.38011	4	1	0	42000
Methylene chloride	µg/m^3	2.0602	0.71253	4	1	0	2100

[1]Where parameters are not detected in a sample during analyses, half of the laboratory reportable limit is used in the average

LEGEND:
µg/m^3 = micrograms per cubic meter

APPENDIX C

DETAILED SAMPLE RESULTS
AMBIENT AIR VOLATILE ORGANIC COMPOUND SAMPLES
BALAD, IRAQ
27 JULY 2009

DOEHRS Sample ID			000012AR	000012AU	000012B2	000012BD
Field/Local Sample ID			IRA_JOINTB_09208_ TO17-1	IRA_JOINTB_09208_ TO17-2	IRA_JOINTB_09208_ TO17-6	IRA_JOINTB_09208_ TO17-5
Site			Catfish Air Terminal	Burn Pit	Burn Pit	Catfish Air Terminal
Start Date/Time			2009/07/27 0450	2009/07/27 0510	2009/07/27 2128	2009/07/27 2058
Parameter	Class	Units	Concentration[1,2]			
1,1,1,2-Tetrachloroethane	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
1,1,1-Trichloroethane	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
1,1,2,2-Tetrachloroethane	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
1,1,2-Trichloroethane	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
1,1-Dichloroethane	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
1,1-Dichloroethene	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
1,1-Dichloropropene	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
1,2,3-Trichlorobenzene	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
1,2,3-Trichloropropane	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
1,2,4-Trichlorobenzene	SVOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
1,2,4-Trimethylbenzene	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
1,2-Dibromo-3-chloropropane	VOC	µg/m^3	< 1.2484	< 1.2876	< 1.3138	< 1.3874

Deployment OEH Risk Characterization, Ambient Air VOC Samples, Balad, Iraq, 27 Jul 09, U_IRQ_BALAD_CM_A17_20090727

DOEHRS Sample ID			000012AR	000012AU	000012B2	000012BD
Field/Local Sample ID			IRA_JOINTB_09208_ TO17-1	IRA_JOINTB_09208_ TO17-2	IRA_JOINTB_09208_ TO17-6	IRA_JOINTB_09208_ TO17-5
Site			Catfish Air Terminal	Burn Pit	Burn Pit	Catfish Air Terminal
Start Date/Time			2009/07/27 0450	2009/07/27 0510	2009/07/27 2128	2009/07/27 2058
Parameter	Class	Units	Concentration[1,2]			
1,2-Dibromoethane	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
1,2-Dichlorobenzene	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
1,2-Dichloroethane	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
1,2-Dichloropropane	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
1,3,5-Trimethylbenzene	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
1,3-Dichlorobenzene	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
1,3-Dichloropropane	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
1,4-Dichlorobenzene	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
2,2-Dichloropropane	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
2-Chlorotoluene	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
4-Chlorotoluene	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
4-Isopropyltoluene	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
Benzene	VOC	µg/m^3	< 0.49936	0.51505	2.7327	< 0.55498
Bromobenzene	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
Bromochloromethane	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
Bromodichloromethane	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
Bromoform	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
Carbon tetrachloride	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
Chlorobenzene	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
Chloroform	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
Cyclohexane	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
Cyclopentane	VOC	µg/m^3	< 0.49936	< 0.51505	0.73574	< 0.55498

DOEHRS Sample ID			000012AR	000012AU	000012B2	000012BD
Field/Local Sample ID			IRA_JOINTB_09208_ TO17-1	IRA_JOINTB_09208_ TO17-2	IRA_JOINTB_09208_ TO17-6	IRA_JOINTB_09208_ TO17-5
Site			Catfish Air Terminal	Burn Pit	Burn Pit	Catfish Air Terminal
Start Date/Time			2009/07/27 0450	2009/07/27 0510	2009/07/27 2128	2009/07/27 2058
Parameter	Class	Units	Concentration[1,2]			
Decane	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
Dibromochloromethane	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
Dibromomethane	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
Ethylbenzene	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
Hexachlorobutadiene	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
Hexane	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
Isooctane	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
Isopropylbenzene	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
Methylcyclopentane	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
Methylene chloride	VOC	µg/m^3	< 0.49936	2.0602	< 0.52553	< 0.55498
Styrene	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
Tetrachloroethene (PCE)	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
Toluene	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
Trichloroethene (TCE)	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
cis-1,2-Dichloroethene	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
cis-1,3-Dichloropropene	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
m,p-Xylene	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
n-Butylbenzene	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
n-Propylbenzene	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
o-Xylene	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
sec-Butylbenzene	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498

DOEHRS Sample ID			000012AR	000012AU	000012B2	000012BD
Field/Local Sample ID			IRA_JOINTB_09208_ TO17-1	IRA_JOINTB_09208_ TO17-2	IRA_JOINTB_09208_ TO17-6	IRA_JOINTB_09208_ TO17-5
Site			Catfish Air Terminal	Burn Pit	Burn Pit	Catfish Air Terminal
Start Date/Time			2009/07/27 0450	2009/07/27 0510	2009/07/27 2128	2009/07/27 2058
Parameter	Class	Units	Concentration[1,2]			
tert-Butylbenzene	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
trans-1,2-Dichloroethene	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498
trans-1,3-Dichloropropene	VOC	µg/m^3	< 0.49936	< 0.51505	< 0.52553	< 0.55498

[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
µg/m^3 = micrograms per cubic meter
VOC = volatile organic compound