DEPARTMENT OF THE ARMY
US ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE
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MCHB-TS-RDE

15 JUN 2007

MEMORANDUM FOR Command Surgeon Office (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 Volatile Organic Compounds, Contingency Operating Base Speicher, Iraq, 9 May 2007, U_IRQ_SPEICHER_CM_A17_20070509

1. The enclosed report details the occupational and environmental health (OEH) risk characterization for three volatile organic compound (VOC) ambient air samples collected by 1437th Medical Detachment–Preventive Medicine personnel at Contingency Operating Base (COB) Speicher, Iraq, 9 May 2007.

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 throughout COB Speicher, Iraq is **low**. Exposure to the ambient air at the sampling locations is expected to have little or no impact on unit readiness.

FOR THE COMMANDER:

(b) (6)

Director, Health Risk Management

Encl

CF: (w/encl)
1437th MED DET (Commander/LTC (b) (6)
MNC-I (Command Surgeon Office/MAJ (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 COMPOUNDS
CONTINGENCY OPERATING BASE
SPEICHER, IRAQ
9 MAY 2007
U_IRQ_SPEICHER_CM_A17_20070509

USCHPPM

Readiness Thru Health

DEPLOYMENT OCCUPATIONAL AND ENVIRONMENTAL
HEALTH RISK CHARACTERIZATION
AMBIENT AIR VOLATILE ORGANIC COMPOUNDS
CONTINGENCY OPERATING BASE
SPEICHER, IRAQ
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1. REFERENCES.

a. 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.

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

2. PURPOSE. According to the 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 the above-mentioned location.

3. SCOPE. This assessment addresses the analytical results of three volatile organic compounds (VOCs) air samples collected from Contingency Operating Base (COB) Speicher, Iraq, 9 May 2007. 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 obtained to assess the potential for adverse health effects to troops routinely and continuously breathing the ambient air at COB Speicher, Iraq. The samples were collected at three areas next to and in between the burn pits and garbage lot. It was indicated that 50 to 75 percent of personnel will be exposed to the ambient air for a deployment duration of approximately 1 year. No adverse weather conditions or near-by active industry were reported. In addition, it is assumed that control measures and/or personal protective equipment are not used.

5. METHOD. The USACHPPM Deployment Environmental Surveillance Program (DESP) 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, based on currently available data. Information about potential health effects are obtained from data provided with the exposure values used to derive the MEGs and symptoms reported from occupational exposures. The quality and quantity of dose and response information available varies with the hazard and the determination of precise "no-effect" levels for low-level exposures for extended and duration involves professional judgment. Hazards with exposure concentrations greater than comparison levels 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 and, therefore, are automatically assigned a low-operational risk estimate.

6. HAZARD IDENTIFICATION.

a. Sample Information. Three valid samples were submitted for analysis.

b. Laboratory Analysis. The three valid samples 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 evaluated 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 valid 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 next to and in between the burn pits and garbage lot at COB Speicher, Iraq is **low**. Exposure to VOCs in the ambient at the sample locations is expected to little or no impact on unit readiness. According to TG 230, Table 3–5, confidence in the risk estimate is considered **low**. The results may not be representative of conditions for the deployment duration. 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. HAZARD CONTROLS/RECOMMENDATION AND NOTE.

a. Recommendation. Continue to collect samples from this location at least once every 6 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 this location.

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 re-evaluated. 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) 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)
Acting Program Manager
Deployment Environmental Surveillance

APPENDIX A

SAMPLING SUMMARY

Table A–1. Summary for Ambient Air Samples Collected from COB Speicher, Iraq, 9 May 2007

Field Identification Number	DESP Identification Number	Sample Location	Collection Date	Tube Identification Number	Sample Duration	Field Notes
IRQSPEICH07218	IRQ_2745_TO17_07129_01	BURN PIT	9-May-07	C4901	411	Placed near burn pit
IRQSPEICH07218	IRQ_2745_TO17_07129_02	DUMP ENTRANCE	9-May-07	C4559	302	Placed near entrance to dump.
IRQSPEICHER07218	IRQ_2745_TO17_07129_03	BURN PIT/DUMP	9-May-07	C5234	418	Placed half-way between entrance and burn-pit

APPENDIX B

SAMPLE RESULTS SUMMARY

Table B–1. Results Summary for Ambient Air Samples Collected from COB Speicher, Iraq, 9 May 2007

						Military Exposure Guidelines					
		Detection Rate		Concentration ($\mu g/m^3$)					1-hour		
Parameter detected above laboratory limit	Units	# detected / # samples	# detected above MEG / # samples	Maximum	Average	1-year	14-days	8-hours	Minimal	Severe	Significant
Benzene	$\mu g/m^3$	2 / 3	0 / 3	13.55676	7.71908	39	160	1600	160000	3200000	480000
Ethylbenzene	$\mu g/m^3$	1 / 3	0 / 3	3.38919	1.47511	3000	11000	440000	540000	8700000	3500000
Methylene chloride	$\mu g/m^3$	1 / 3	0 / 3	1.38231	0.73793	2100	2100	175000	700000	14000000	2600000
Styrene	$\mu g/m^3$	1 / 3	0 / 3	14.40406	5.14674	2000	No MEG	No MEG	210000	4300000	1100000
Toluene	$\mu g/m^3$	1 / 3	0 / 3	5.93108	2.32241	4600	11000	750000	750000	11000000	2000000

Note:
$\mu g/m^3$ – microgram per cubic meter
No MEG – MEG not established.

APPENDIX C

DETAILED SAMPLE RESULTS

Table C–1. Analytical Results for Ambient Air Samples VOC Collected from COB Speicher, Iraq, 9 May 2007

			Field ID	IRQSPEICH07218	IRQSPEICH07218	IRQSPEICHER07218
			DESP ID	IRQ_2745_TO17_07129_02	IRQ_2745_TO17_07129_01	IRQ_2745_TO17_07129_03
			Location	SPEICHER	SPEICHER	SPEICHER
			Collection Date	9-May-07	9-May-07	9-May-07
			Collection Time	10:00	10:00	10:00
Parameter	Chemical Abstract Number	Units		Concentration	Concentration	Concentration
1,1,1,2-Tetrachloroethane	630206	µg/m^3		< 1.256645	< 0.815652	< 0.847298
1,1,1-Trichloroethane	71556	µg/m^3		< 1.256645	< 0.815652	< 0.847298
1,1,2,2-Tetrachloroethane	79345	µg/m^3		< 1.256645	< 0.815652	< 0.847298
1,1,2-Trichloroethane	79005	µg/m^3		< 1.256645	< 0.815652	< 0.847298
1,1-Dichloroethane	75343	µg/m^3		< 1.256645	< 0.815652	< 0.847298
1,1-Dichloroethene	75354	µg/m^3		< 1.256645	< 0.815652	< 0.847298
1,1-Dichloropropene	563586	µg/m^3		< 1.256645	< 0.815652	< 0.847298
1,2,3-Trichlorobenzene	87616	µg/m^3		< 3.141611	< 2.03913	< 2.118244
1,2,3-Trichloropropane	96184	µg/m^3		< 1.256645	< 0.815652	< 0.847298
1,2,4-Trichlorobenzene	120821	µg/m^3		< 3.141611	< 2.03913	< 2.118244
1,2,4-Trimethylbenzene	95636	µg/m^3		< 1.256645	< 0.815652	< 0.847298
1,2-Dibromo-3-chloropropane	96128	µg/m^3		< 1.256645	< 0.815652	< 0.847298
1,2-Dibromoethane	106934	µg/m^3		< 1.256645	< 0.815652	< 0.847298
1,2-Dichlorobenzene	95501	µg/m^3		< 1.256645	< 0.815652	< 0.847298
1,2-Dichloroethane	107062	µg/m^3		< 1.256645	< 0.815652	< 0.847298
1,2-Dichloropropane	78875	µg/m^3		< 1.256645	< 0.815652	< 0.847298
1,3,5-Trimethylbenzene	108678	µg/m^3		< 1.256645	< 0.815652	< 0.847298
1,3-Dichlorobenzene	541731	µg/m^3		< 1.256645	< 0.815652	< 0.847298
1,3-Dichloropropane	142289	µg/m^3		< 1.256645	< 0.815652	< 0.847298
1,4-Dichlorobenzene	106467	µg/m^3		< 1.256645	< 0.815652	< 0.847298
2,2-Dichloropropane	594207	µg/m^3		< 1.256645	< 0.815652	< 0.847298
2-Chlorotoluene	95498	µg/m^3		< 1.256645	< 0.815652	< 0.847298
4-Chlorotoluene	106434	µg/m^3		< 1.256645	< 0.815652	< 0.847298
4-Isopropyltoluene	99876	µg/m^3		< 1.256645	< 0.815652	< 0.847298
Benzene	71432	µg/m^3		< 1.256645	**8.972172**	**13.55676**

Deployment OEH Risk Characterization, Ambient Air VOCs, COB Speicher, Iraq, 9 May 07, U_IRQ_SPEICHER_CM_A17_20070509

Table C–1. Analytical Results for Ambient Air Samples Collected from COB Speicher, Iraq, 9 May 2007 (continued)

		Field ID	IRQSPEICH07218	IRQSPEICH07218	IRQSPEICHER07218
		DESP ID	IRQ_2745_TO17_07129_02	IRQ_2745_TO17_07129_01	IRQ_2745_TO17_07129_03
		Location	SPEICHER	SPEICHER	SPEICHER
		Collection Date	9-May-07	9-May-07	9-May-07
		Collection Time	10:00	10:00	10:00
Parameter	Chemical Abstract Number	Units	Concentration	Concentration	Concentration
Bromobenzene	108861	µg/m^3	< 1.256645	< 0.815652	< 0.847298
Bromochloromethane	74975	µg/m^3	< 1.256645	< 0.815652	< 0.847298
Bromodichloromethane	75274	µg/m^3	< 1.256645	< 0.815652	< 0.847298
Bromoform	75252	µg/m^3	< 3.141611	< 2.03913	< 2.118244
Carbon tetrachloride	56235	µg/m^3	< 1.256645	< 0.815652	< 0.847298
Chlorobenzene	108907	µg/m^3	< 1.256645	< 0.815652	< 0.847298
Chloroform	67663	µg/m^3	< 1.256645	< 0.815652	< 0.847298
Cyclohexane	110827	µg/m^3	< 1.256645	< 0.815652	< 0.847298
Cyclopentane	287923	µg/m^3	< 1.256645	< 0.815652	< 0.847298
Decane	124185	µg/m^3	< 1.256645	< 0.815652	< 0.847298
Dibromochloromethane	124481	µg/m^3	< 1.256645	< 0.815652	< 0.847298
Dibromomethane	74953	µg/m^3	< 1.256645	< 0.815652	< 0.847298
Ethylbenzene	100414	µg/m^3	< 1.256645	< 0.815652	**3.38919**
Hexachlorobutadiene	87683	µg/m^3	< 1.256645	< 0.815652	< 0.847298
Hexane	110543	µg/m^3	< 1.256645	< 0.815652	< 0.847298
Isooctane	540841	µg/m^3	< 1.256645	< 0.815652	< 0.847298
Isopropylbenzene	98828	µg/m^3	< 1.256645	< 0.815652	< 0.847298
Methylcyclopentane	96377	µg/m^3	< 1.256645	< 0.815652	< 0.847298
Methylene chloride	75092	µg/m^3	**1.382309**	< 0.815652	< 0.847298
Styrene	100425	µg/m^3	< 1.256645	< 0.815652	**14.404058**
Tetrachloroethene	127184	µg/m^3	< 1.256645	< 0.815652	< 0.847298
Toluene	108883	µg/m^3	< 1.256645	< 0.815652	**5.931083**
Trichloroethene	79016	µg/m^3	< 1.256645	< 0.815652	< 0.847298
cis-1,2-Dichloroethene	156592	µg/m^3	< 1.256645	< 0.815652	< 0.847298

Deployment OEH Risk Characterization, Ambient Air VOCs, COB Speicher, Iraq, 9 May 07, U_IRQ_SPEICHER_CM_A17_20070509

Table C–1. Analytical Results for Ambient Air Samples Collected from COB Speicher, Iraq, 9 May 2007

			Field ID	IRQSPEICH07218	IRQSPEICH07218	IRQSPEICHER07218
			DESP ID	IRQ_2745_TO17_07129_02	IRQ_2745_TO17_07129_01	IRQ_2745_TO17_07129_03
			Location	SPEICHER	SPEICHER	SPEICHER
			Collection Date	9-May-07	9-May-07	9-May-07
			Collection Time	10:00	10:00	10:00
Parameter	Chemical Abstract Number	Units		Concentration	Concentration	Concentration
cis-1,3-Dichloropropene	10061015	µg/m^3		< 1.256645	< 0.815652	< 0.847298
m/p-Xylene	108383;10	µg/m^3		< 1.256645	< 0.815652	< 0.847298
n-Butylbenzene	104518	µg/m^3		< 1.256645	< 0.815652	< 0.847298
n-Propylbenzene	103651	µg/m^3		< 1.256645	< 0.815652	< 0.847298
o-Xylene	95476	µg/m^3		< 1.256645	< 0.815652	< 0.847298
sec-Butylbenzene	135988	µg/m^3		< 1.256645	< 0.815652	< 0.847298
tert-Butylbenzene	98066	µg/m^3		< 1.256645	< 0.815652	< 0.847298
trans-1,2-Dichloroethene	156605	µg/m^3		< 1.256645	< 0.815652	< 0.847298
trans-1,3-Dichloropropene	10061026	µg/m^3		< 1.256645	< 0.815652	< 0.847298

Notes:
Where parameters are not detected in a sample during analyses, half of the laboratory reportable limit is used in the average.
µg/m^3 micrograms per cubic meter