



DEPARTMENT OF THE ARMY
US ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE-EUROPE
CMR 402
APO AE 09180

REPLY TO
ATTENTION OF

MCHB-AE-EE

01 February 2007


MEMORANDUM FOR 227th Medical Detachment, 1st Medical Brigade (SSG Martinez), Camp Arifjan, Kuwait, APO AE 09366

SUBJECT: Deployment Environmental Surveillance Program, Soil Quality Assessment, Project Number 47-4K-16858-07, Camp Arifjan, Kuwait, 02 November 2006.

A copy of the report is enclosed. We are very interested in your comments and suggestions for improving the usefulness of the information and recommendations provided in the report. If you have comments, or if this report does not meet your needs or expectations, please contact me at DSN (314) 486-8542 or commercial at (49) 6371-86-8942.

FOR THE COMMANDER:

Encl
as


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EXECUTIVE SUMMARY
DEPLOYMENT ENVIRONMENTAL SURVEILLANCE PROGRAM
SOIL QUALITY ASSESSMENT
PROJECT NUMBER 47-4K-16858-07
CAMP ARIFJAN, KUWAIT
02 NOVEMBER 2006

1. **PURPOSE.** In accordance with U.S. Department of Defense medical surveillance requirements, this Occupational Environmental Health (OEH) risk characterization documents the identification and evaluation of chemical hazards that pose potential health and operational risks to deployed troops. The primary reference for this report is the 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 (reference 1).

2. **CONCLUSION.** All parameters analyzed were less than their USACHPPM TG 230 Military Exposure Guidelines (MEGs); therefore, the OEH risk estimate for exposure to this soil at Camp Arifjan, Kuwait, is considered **LOW**. The confidence in the risk estimate is **LOW** due to only one sample being collected and a lack of detailed personnel exposure information for this site.

3. **RECOMMENDATIONS.**

- a. Collect additional soil samples at this site if there is some change in soil conditions.
- b. Comply with the sampling and shipping recommendations in USACHPPM TG 251 in future sampling studies to improve data quality.

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1. **REFERENCES.** A complete listing of references is provided in Appendix A.
2. **PURPOSE.** In accordance with U.S. Department of Defense medical surveillance requirements, this occupational and environmental health (OEH) risk characterization documents the identification and evaluation of chemical hazards that pose potential health and operational risks to deployed troops. Specifically, the sample and information provided on the associated field data sheet were used to estimate the operational health risk associated with personnel exposure to identified chemical hazards in the soil. The primary reference for this report is the 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 (reference 1).
3. **SCOPE.** This evaluation addresses the analytical results for one soil sample collected on 02 November 2006, from Camp Arifjan, Kuwait. Appendix B contains a summary of the sample evaluated. This sample is limited in time, area, and media; therefore, 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 {Field Manual (FM) 5-19 (reference 2)} and the relatively conservative (protective) assumptions and methods provided in USACHPPM TG 230 to facilitate decision making that can minimize the likelihood of significant risks.
4. **BACKGROUND AND EXPOSURE ASSUMPTIONS.** The sample was obtained to assess the potential for adverse health effects to personnel coming into contact with the soil at Camp Afrijan, Kuwait. The field data sheet indicates that the sample was a discrete surface sample collected on top of an empty, sealed septic tank. The degree of exposure to the soil is considered low (non-traffic area, restricted area). One percent of personnel at Camp Arifjan are expected to be exposed to this soil. Personnel are expected to remain at this location for less than one year.
5. **METHOD.** The U.S. Army Center for Health Promotion and Preventive Medicine-Europe (USACHPPMEUR) Deployment Environmental Surveillance Program uses USACHPPM 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.

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As part of the hazard identification step, long-term (1-year) MEGs are used as screening criteria to identify those hazards that are potential health threats. At concentrations below the 1-year MEG no health effects (including delayed or chronic disease or significant increased risk of cancer) are anticipated even after a year of continuous daily exposure. Constituents that are identified above the 1-year MEGs are further evaluated using USACHPPM TG 230 Chapter 3 methodology.

6. HAZARD IDENTIFICATION.

a. Sample Analysis. The USACHPPMEUR Department of Laboratory Services (DLS) analyzed the soil sample for metals, total petroleum hydrocarbons (TPH), polychlorinated biphenyls (PCBs), pesticides and herbicides (SVOCs), and radiological activity. Appendix C contains information on test methods and laboratory accreditation. Appendix D presents a summary of the results.

b. Sampling Errors. The sample arrived at the USACHPPMEUR DLS on 09 November 2006 at a temperature of 14 °C. This is above the recommended temperatures for preservation of 2 °C - 6 °C as outlined in USACHPPM TG 251 (reference 3). At temperatures above the recommended limits, compounds of interest can chemically degrade, potentially resulting in false negative analytical results. In addition, the sample was received two days past the hold time for pesticide/herbicide analysis.

c. Sample Results. Analytical results were less than their USACHPPM TG 230 MEGs in the sample. The analytical results for the sample reported by the USACHPPMEUR DLS are provided in Appendix D.

7. HAZARD ASSESSMENT.

a. Hazard Severity and Probability. Since concentrations were less than their USACHPPM TG 230 MEGs, the hazard severity is **NEGLIGIBLE** and the hazard probability is **UNLIKELY**.

b. Risk Estimate and Confidence. The hazard severity and probability levels described above were used with the ORM matrix in USACHPPM TG 230 Table 3-3/FM 5-19 to provide a risk estimate of **LOW** for exposure to the soil. The confidence in the risk estimate is considered **LOW** due to the lack of well defined exposure conditions and only one sample being collected. The analytical results from the sample are not enough to adequately characterize the condition of the soil 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.

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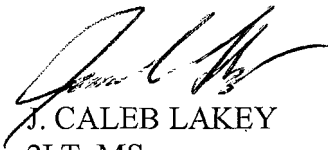
8. **CONCLUSION.** All parameters analyzed were less than their USACHPPM TG 230 MEGs; therefore, the OEH risk estimate for exposure to the soil at Camp Arifjan, Kuwait, is considered **LOW**. The confidence in the risk estimate is **LOW** due to only one sample being collected and a lack of detailed personnel exposure information for this site.

9. **RECOMMENDATION.**

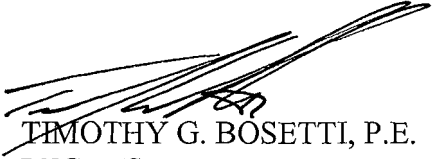
a. Collect additional soil samples at this site if there is some change in soil conditions.

b. Comply with the sampling and shipping recommendations in USACHPPM TG 251 in future sampling studies to improve data quality.

10. **TECHNICAL ASSISTANCE.** Questions concerning this report should be directed to Mr. Chris Childs at DSN (314) 486-8958, fax DSN (314) 486-8954, civilian (49) 6371-86-7049, or email: christopher.childs2@us.army.mil. Requests for additional services should be directed to the Environmental Engineering Division, USACHPPMEUR, LTC Timothy G. Bosetti at DSN (314) 486-8959 or email: timothy.bosetti@us.army.mil.


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APPENDIX A

REFERENCES

1. USACHPPM, Technical Guide (TG) 230, *Chemical Exposure Guidelines for Deployed Military Personnel Updated May 2003 with January 2004 Addendum*, January 2004.
2. Department of the Army, Field Manual 5-19, *Risk Management*, 21 August 2006.
3. USACHPPM, Draft Technical Guide (TG) 251, *A Soldiers Guide to Environmental and Occupational Field Sampling for Military Deployment*, August 2001.

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APPENDIX B

SAMPLE SUMMARY

| Field Sample Identification Number | Sample Location | Sampling Date | Sampling Time | Sample Type | Field Notes |
|---|------------------------|----------------------|----------------------|--------------------|--|
| KUWARI01A | Camp Arifjan, Kuwait | 02 NOV 2006 | 1403 | Surface/ Discrete | Bottle 1 sampled for metals Bottle 2 sampled for TPH Bottle 3 sampled for SVOC Bottle 4 sampled for radiological activity |

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APPENDIX C

LABORATORY METHODOLOGY, ACCREDITATION, AND SAMPLE SHIPMENT

1. LABORATORY METHODOLOGY

a. The USACHPPMEUR DLS uses the HAZCAT test kit as a methodology guide for identifying unknown material samples. Initial tests identified the general class(es) of compounds present and then additional tests were conducted based on the results. It is a qualitative rather than a quantitative test method since it will determine if a material (or type of material) is present, but not necessarily determine the concentration or amount. Laboratory equipment not specified in the HAZCAT procedural guide was used to refine some test results; for example, a Gas Chromatograph – Mass Spectrometer was used to qualitatively screen the sample for organic compounds and a Purge and Trap Gas Chromatograph was used to qualitatively screen the sample for volatile organic compounds.

b. Metals were tested quantitatively by the USACHPPMEUR DLS using EPA Method 200.7. For additional details, please consult the USACHPPMEUR DLS Customer Guide, available on-line at www.chppmeur.healthcare.hqusareur.army.mil.

2. LABORATORY ACCREDITATION.

a. DLS. The Deutscher Akkreditierungs Rat (DAR) (German Accreditation Council) recognizes the DIN EN ISO/IEC 17025 accreditation by the Deutsches Akkreditierungssystem Prüfwesen GmbH (DAP) of the USACHPPMEUR DLS. The DAP is signatory to the Multilateral Agreement of the European cooperation for Accreditation and to the Mutual Recognition Agreement of the International Laboratory Accreditation Cooperation. The signatories to these agreements mutually recognize their accreditations of testing laboratories. The countries of Belgium, Germany, Italy, The Netherlands, Spain, United Kingdom, and the U.S. are among the signatories. The American Industrial Hygiene Association (AIHA) has also accredited the DLS Environmental Lead Testing Program, according to the requirements of ISO/IEC 17025, which is recognized under the EPA Office of Pollution Prevention and Toxics' National Lead Laboratory Accreditation Program for the matrices of dust, soil, paint chips (residual), and air. USACHPPMEUR DLS is registered to ISO 9001:2000 for its Quality Management System and to ISO 14001 for its Environmental Management System.

b. Contract Laboratories. As dictated by the mission or workload, USACHPPMEUR DLS may utilize the services of local laboratories with similar accreditation which are under contract to USACHPPMEUR. Additional accreditation information is available upon request.

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c. Sample Shipment. Environmental sample temperatures should be maintained between 2° C and 6 ° C during transportation. Use a cooler and refrigerants to maintain the samples temperature. Use USACHPPM TG 251, Table 2-6, to determine the amount of refrigerant sufficient to achieve and maintain proper shipping temperatures. Pre-frozen gel-blocks are recommended; ice should be used only when gel-blocks are not available. When used, ice must be sealed in heavy double-layered plastic bags to prevent leakage as it melts. Sealable type freezer bags are recommended because of their extra thickness. When possible pre-cool shipping coolers to below 4 ° C. Coordinate in advance with shipping agent prior to sample collection to ensure the shortest delivery time to USACHPPMEUR.

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APPENDIX D

USACHPPMEUR LABORATORY ANALYSIS

Footnotes for the following tables:

¹ TG 230 – USACHPPM Technical Guide 230 – Short Term Chemical Exposure Guidance

² MEG – Military Exposure Guideline (1-year deployment)

** - Parameter is not covered by this reference

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Table D-1: Metals

| | | | |
|--------------------|----------|---|----------------|
| FIELD ID | | | KUWARI01A06306 |
| PROJECT NUMBER | | | 47-4K-16858-07 |
| LOCATION | | | Camp Arifjan |
| | | | Kuwait |
| COLLECTION DATE | STANDARD | | 2-Nov-07 |
| PARAMETERS | UNITS | TG 230 ¹ MEG ² | RESULTS |
| Metals | | | |
| Beryllium | mg/kg | 16,000 | <0.5 |
| Barium | mg/kg | 18,000 | 23 |
| Cadmium | mg/kg | 130 | <0.5 |
| Chromium (total) | mg/kg | 5,700 | 13 |
| Cobalt | mg/kg | ** | <5.0 |
| Copper | mg/kg | ** | <5.0 |
| Lead | mg/kg | 2,200 | <2.5 |
| Manganese | mg/kg | ** | 110 |
| Molybdenum | mg/kg | 1,300 | <5 |
| Nickel | mg/kg | 5,300 | 19 |
| Silver | mg/kg | 1,300 | <0.5 |
| Zinc | mg/kg | 69,000 | 12 |
| Arsenic | mg/kg | 1,100 | <2.0 |
| Selenium | mg/kg | 1,300 | <5.0 |
| Mercury | mg/kg | 33 | <0.1 |
| Percent Dry Weight | % | -- | 99.6 |

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Table D-2: PCBs/TPH/Radiological

| FIELD ID | | | KUWARI01A06306 |
|--|----------|---|----------------|
| PROJECT NUMBER | | | 47-4K-16858-07 |
| LOCATION | | | Camp Arifjan |
| COLLECTION DATE | | | Kuwait |
| | STANDARD | | 2-Nov-07 |
| PARAMETERS | UNITS | TG 230 ¹ MEG ² | RESULTS |
| Polychlorinated Biphenyls (PCBs) | | | |
| Total PCB/German Waste Oil Reg | mg/kg | ** | <0.0025 |
| 2,2',4,5,5'-Pentachlorobiphenyl (PCB No. 101) | mg/kg | ** | <0.0005 |
| 2,2',3,4,4',5'-Hexachlorobiphenyl (PCB No. 138) | mg/kg | ** | <0.0005 |
| 2,2',4,4',5,5'-Hexachlorobiphenyl (PCB No. 153) | mg/kg | ** | <0.0005 |
| 2,2',3,4,4',5,5'-Heptachlorobiphenyl (PCB No. 180) | mg/kg | ** | <0.0005 |
| 2,4,4'-Trichlorobiphenyl (PCB No. 28) | mg/kg | ** | <0.0005 |
| 2,2',5,5'-Tetrachlorobiphenyl (PCB No. 52) | mg/kg | ** | <0.0005 |
| Total PCB | mg/kg | 2.1 | <0.0005 |
| Total Petroleum Hydrocarbons | | | |
| TPH | mg/kg | ** | 69 |
| Radiological Activity | | | |
| Alpha Activity | uCi/g | ** | 0.000050300 |
| Alpha Uncertainty (+/-) | uCi/g | -- | ±0.00000391 |
| Alpha Minimum Detectable Activity | uCi/g | -- | 0.000004250 |
| Beta Activity | uCi/g | ** | 0.000086600 |
| Beta Uncertainty (+/-) | uCi/g | -- | ±0.00000274 |
| Beta Minimum Detectable Activity | uCi/g | -- | 0.00000322 |

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Table D-3: Pesticides/Herbicides

| FIELD ID | | | KUWARI01A06306 |
|------------------------------|----------|---|----------------|
| PROJECT NUMBER | | | 47-4K-16858-07 |
| LOCATION | | | Camp Arifjan |
| | | | Kuwait |
| COLLECTION DATE | STANDARD | | 2-Nov-07 |
| PARAMETERS | UNITS | TG 230 ¹ MEG ² | RESULTS |
| Pesticides/Herbicides | | | |
| 2,4,5-TP (Silvex) | mg/kg | 2,600 | <0.05 |
| 2,4-D | mg/kg | 1,000 | <0.05 |
| Pentachlorophenol | mg/kg | 3,100 | <0.05 |
| 1-Methylnaphthalene | mg/kg | ** | <0.01 |
| 2-Methylnaphthalene | mg/kg | 2.6 | <0.01 |
| Azinphosethyl | mg/kg | ** | <0.1 |
| Chlorfenvinphos | mg/kg | ** | <0.1 |
| Dimethoat | mg/kg | ** | <0.1 |
| Parathionethyl | mg/kg | ** | <0.1 |
| Parathionmethyl | mg/kg | ** | <0.1 |
| o,p'-DDD | mg/kg | ** | <0.05 |
| o,p'DDE | mg/kg | ** | <0.05 |
| o,p'DDT | mg/kg | ** | <0.05 |
| p,p'-DDD | mg/kg | ** | <0.05 |
| p,p'-DDE | mg/kg | 52 | <0.05 |
| p,p'-DDT | mg/kg | 52 | <0.05 |
| alpha HCH | mg/kg | ** | <0.02 |
| beta HCH | mg/kg | ** | <0.02 |
| delta HCH | mg/kg | ** | <0.02 |
| Dieldrin | mg/kg | 5.2 | <0.02 |
| Hexachlorobenzene (HCB) | mg/kg | 31 | <0.02 |
| Heptachlor | mg/kg | 52 | <0.02 |
| Heptachlor Epoxide | mg/kg | 1.5 | <0.02 |
| gamma HCH (Lindane) | mg/kg | 560 | <0.02 |
| Aldrin | mg/kg | 3.0 | <0.02 |
| Atrazine | mg/kg | ** | <0.02 |
| Methoxychlor | mg/kg | ** | <0.05 |
| Simazine | mg/kg | 520.0 | <0.02 |