



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

08 OCT 2009

MCHB-TS-RDE

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, Soil and Associated Dust Samples, Copper, Iraq, 13 August 2009, U\_IRQ\_COPPER\_CM\_SQA\_20090813

1. The enclosed report details the occupational and environmental health (OEH) risk characterization for three soil samples collected by 230<sup>th</sup> Brigade Support Battalion personnel at Copper, Iraq, 13 August 2009.
2. The OEH risk estimate for exposure to the soil and associated dust at the shona track, burn pit, and mobile kitchen trailer by the main walkway of Copper, Iraq is **low**. None of the chemical or physical parameters were detected at concentrations above their respective military exposure guidelines. Exposure to the soil and associated dust is expected to have little or no impact on unit readiness.

FOR THE COMMANDER:

(b) (6)

Encl

Director, Health Risk Management

CF: (w/encl)

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CLB-5 HQ (LCDR (b) (6))

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(CONT)

MCHB-TS-RDE

SUBJECT: Deployment Occupational and Environmental Health Risk Characterization, Soil and Associated Dust Samples, Copper, Iraq, 13 August 2009,  
U\_IRQ\_COPPER\_CM\_SQA\_20090813

CF: (w/encl) (CONT)

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MARFORPAC (Force Surgeon Office/LCDR (b) (6))

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

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DEPLOYMENT OCCUPATIONAL AND ENVIRONMENTAL  
HEALTH RISK CHARACTERIZATION  
SOIL AND ASSOCIATED DUST SAMPLES  
COPPER, IRAQ  
13 AUGUST 2009  
U\_IRQ\_COPPER\_CM\_SQA\_20090813

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CHPPM FORM 1433-E (MCHB-CS-IPD), OCT 03

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Preventive Medicine Survey: 40-5f1

## Readiness Thru Health

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DEPLOYMENT OCCUPATIONAL AND ENVIRONMENTAL  
HEALTH RISK CHARACTERIZATION  
SOIL AND ASSOCIATED DUST SAMPLES  
COPPER, IRAQ  
13 AUGUST 2009  
U\_IRQ\_COPPER\_CM\_SQA\_20090813

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 personnel exposure to identified chemical hazards in the soil at Copper, Iraq.

3. SCOPE. This assessment addresses the analytical results for three soil samples collected from Copper, Iraq, 13 August 2009. 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 soil samples were collected to assess the potential for adverse health effects to personnel coming into contact with the sampled soil and associated dust at Copper, Iraq. Three surface discrete soil samples were collected from the shona track, burn pit and mobile kitchen trailer (MKT) by the main walkway. The degree of exposure to the soil is considered medium (that is, walking area, common area, grassy athletic

fields, etc.). It is expected that all of the personnel at this location are exposed to the soil in this area. Personnel are expected to remain on at this location for less than 1 year.

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 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 AND ASSESSMENT.

a. Laboratory Analysis. The three soil samples were analyzed for metals, pesticides/polychlorinated biphenyls (PCBs), herbicides, radionuclides, and semivolatile organic compounds (SVOCs). An information summary for the samples is contained in Appendix A. Appendix B presents a sample results summary table for all detected parameters. Appendix C presents detailed laboratory results.

b. Risk Estimate. None of the parameters detected in the three soil samples collected were present at concentrations greater than their respective MEGs. Therefore, no potential health threats were identified, and the risk estimate is considered **low**.

7. **CONCLUSION.** The OEH risk estimate for exposure to the soil and associated dust at the shona track, burn pit and MKT by the main walkway, Copper, Iraq is **low**. Confidence in the risk estimate is considered **medium**. Exposure to the soil and associated dust is expected to have little or no impact on unit readiness.

#### 8. RECOMMENDATIONS AND NOTES.

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a. Recommendations. Although there is a low risk of mission impact due to exposure to soil and associated dust at this location, the following general personal protection recommendations should be followed.

(1) Minimize skin exposure to the soil and associated dust, the uniform should be worn properly: roll sleeves down, tuck pants into boots, and tuck undershirt into pants.

(2) Ensure hand washing stations are readily available. Wash hands and face with soap and water prior to eating, drinking, or smoking.

(3) Report any symptoms to a health care provider in order to identify potential causes and implement hazard control measures.

(4) Collect additional soil samples from this site/area if there is a known change in or concern with the soil conditions.

b. Note.

(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, provide updated information so that the risk estimate can be reassessed. If additional samples from these areas 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 (DoDD) 6490.02E and Department of Defense Instruction (DoDI) 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 archived DOEHS data at <https://doehsportal.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 Ms. (b) (6) and Ms. (b) (6). Ms. (b) (6) may be contacted at e-mail (b) (6); Ms. (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

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APPENDIX A

SAMPLING SUMMARY  
SOIL AND ASSOCIATED DUST SAMPLES  
COPPER, IRAQ  
13 AUGUST 2009

| DOEHRS Sample ID | Field/Local Sample ID | Site   | Start Date/Time | Collection Type |
|------------------|-----------------------|--|-----------------|-----------------|
| 000014DD         | IRA_COPPER_01S_09225  | Shona Track                                  | 2009/08/13 0845 | Soil-Discrete   |
| 000014EA         | IRA_COPPER_02S_09225  | Burn Pit                                     | 2009/08/13 0845 | Soil-Discrete   |
| 000014EB         | IRA_COPPER_03S_09225  | Mobile Kitchen<br>Trailer on main<br>walkway | 2009/08/13 0845 | Soil-Discrete   |

LEGEND:

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



APPENDIX B

RESULTS SUMMARY  
SOIL AND ASSOCIATED DUST SAMPLES  
COPPER, IRAQ  
13 AUGUST 2009

| Parameter                 | Units | Sample Identification        |                      |  | Average  | # > Laboratory Reporting Limit | USACHPPM TG230 Military exposure Guideline (MEG) |         |
|---------------------------|-------|------------------------------|----------------------|--|----------|--------------------------------|--|---------|
|                           |       | IRA_COPPER_01S_09225         | IRA_COPPER_02S_09225 | IRA_COPPER_03S_09225                   |          |                                | 1 year   |         |
|                           |       | Shona Track                  | Burn Pit             | Mobile Kitchen Trailer on main walkway |          |                                | # > MEG  | MEG     |
|                           |       | Concentration <sup>1,2</sup> |                      |  |          |                                | # > MEG  | MEG     |
| 2-Methylnaphthalene       | mg/kg | < 0.34                       | < 0.34               | 1.8                                    | 0.71333  | 1                              | 0  | 2.6     |
| Barium                    | mg/kg | 102                          | 79.7                 | 73.7                                   | 85.133   | 3                              | 0  | 18000   |
| Cadmium                   | mg/kg | 7.19                         | 5.06                 | 7.24                                   | 6.4967   | 3                              | 0  | 130     |
| Chromium                  | mg/kg | 77                           | 54.2                 | 79                                     | 70.067   | 3                              | 0  | 5700    |
| Di(2-ethylhexyl)phthalate | mg/kg | < 0.34                       | 6                    | < 0.34                                 | 2.1133   | 1                              | 0  | 2900    |
| Dimethylphthalate         | mg/kg | 0.42                         | 0.93                 | < 0.34                                 | 0.50667  | 2                              | 0  | 1000000 |
| Di-n-butylphthalate       | mg/kg | < 0.34                       | 0.43                 | < 0.34                                 | 0.25667  | 1                              | 0  | 26000   |
| Di-n-octylphthalate       | mg/kg | < 0.34                       | 1.4                  | < 0.34                                 | 0.58     | 1                              | 0  | 4200    |
| Mercury                   | mg/kg | 0.0134                       | < 0.0121             | 0.0159                                 | 0.011783 | 2                              | 0  | 33      |
| Nickel                    | mg/kg | 122                          | 75.8                 | 125                                    | 107.6    | 3                              | 0  | 5300    |
| Phenol                    | mg/kg | < 0.34                       | 0.35                 | < 0.34                                 | 0.23     | 1                              | 0  | 31000   |
| Strontium                 | mg/kg | 285                          | 424                  | 278                                    | 329      | 3                              | 0  | 140000  |

<sup>1</sup>Laboratory detection limit is parameter and sample specific

<sup>2</sup>< X.XX = Below laboratory reporting limit (X.XX)

LEGEND:

mg/kg = milligram per kilogram

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APPENDIX C

ANALYTICAL RESULTS  
SOIL AND ASSOCIATED DUST SAMPLES  
COPPER, IRAQ  
13 AUGUST 2009

| DOEHRS Sample ID       |            |       | 000014DD                     | 000014EA             | 000014EB                               |
|------------------------|------------|-------|------------------------------|----------------------|--|
| Field/Local Sample ID  |            |       | IRA_COPPER_01S_09225         | IRA_COPPER_02S_09225 | IRA_COPPER_03S_09225                   |
| Site                   |            |       | Shona Track                  | Burn Pit             | Mobile Kitchen Trailer on main walkway |
| Start Date             |            |       | 2009/08/13 0845              | 2009/08/13 0845      | 2009/08/13 0845                        |
| Parameter              | Class      | Units | Concentration <sup>1,2</sup> |                      |  |
| 1,2,4-Trichlorobenzene | SVOC       | mg/kg | < 0.34                       | < 0.34               | < 0.34                                 |
| 1,2-Dichlorobenzene    | VOC        | mg/kg | < 0.34                       | < 0.34               | < 0.34                                 |
| 1,3-Dichlorobenzene    | VOC        | mg/kg | < 0.34                       | < 0.34               | < 0.34                                 |
| 1,4-Dichlorobenzene    | VOC        | mg/kg | < 0.34                       | < 0.34               | < 0.34                                 |
| 2,4,5-T                | Herbicides | mg/kg | < 0.05                       | < 0.05               | < 0.05                                 |
| 2,4,5-TP (Silvex)      | Herbicides | mg/kg | < 0.05                       | < 0.05               | < 0.05                                 |
| 2,4,5-Trichlorophenol  | SVOC       | mg/kg | < 0.34                       | < 0.34               | < 0.34                                 |
| 2,4,6-Trichlorophenol  | SVOC       | mg/kg | < 0.34                       | < 0.34               | < 0.34                                 |
| 2,4-D                  | Herbicides | mg/kg | < 0.05                       | < 0.05               | < 0.05                                 |
| 2,4-DB                 | Herbicides | mg/kg | < 0.05                       | < 0.05               | < 0.05                                 |
| 2,4-Dichlorophenol     | SVOC       | mg/kg | < 0.34                       | < 0.34               | < 0.34                                 |
| 2,4-Dimethylphenol     | SVOC       | mg/kg | < 0.34                       | < 0.34               | < 0.34                                 |
| 2,4-Dinitrophenol      | SVOC       | mg/kg | < 0.67                       | < 0.68               | < 0.67                                 |
| 2,4-Dinitrotoluene     | SVOC       | mg/kg | < 0.34                       | < 0.34               | < 0.34                                 |
| 2,6-Dinitrotoluene     | SVOC       | mg/kg | < 0.34                       | < 0.34               | < 0.34                                 |
| 2-Chloronaphthalene    | SVOC       | mg/kg | < 0.34                       | < 0.34               | < 0.34                                 |
| 2-Chlorophenol         | SVOC       | mg/kg | < 0.34                       | < 0.34               | < 0.34                                 |
| 2-Methyl-4,6-          | SVOC       | mg/kg | < 0.34                       | < 0.34               | < 0.34                                 |

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| DOEHRS Sample ID          |              | 000014DD             | 000014EA                     | 000014EB                               |               |
|---------------------------|--------------|----------------------|------------------------------|--|---------------|
| Field/Local Sample ID     |              | IRA_COPPER_01S_09225 | IRA_COPPER_02S_09225         | IRA_COPPER_03S_09225                   |               |
| Site                      |              | Shona Track          | Burn Pit                     | Mobile Kitchen Trailer on main walkway |               |
| Start Date                |              | 2009/08/13 0845      | 2009/08/13 0845              | 2009/08/13 0845                        |               |
| Parameter                 | Class        | Units                | Concentration <sup>1,2</sup> |  |               |
| dinitrophenol             |              |                      |                              |  |               |
| 2-Methylnaphthalene       | SVOC         | mg/kg                | < 0.34                       | < 0.34                                 | 1.8           |
| 2-Methylphenol (o-Cresol) | SVOC         | mg/kg                | < 0.34                       | < 0.34                                 | < 0.34        |
| 2-Nitroaniline            | SVOC         | mg/kg                | < 0.34                       | < 0.34                                 | < 0.34        |
| 2-Nitrophenol             | SVOC         | mg/kg                | < 0.34                       | < 0.34                                 | < 0.34        |
| 3,5-Dichlorobenzoic acid  | Herbicides   | mg/kg                | < 0.05                       | < 0.05                                 | < 0.05        |
| 3-Nitroaniline            | SVOC         | mg/kg                | < 0.67                       | < 0.68                                 | < 0.67        |
| 4-Chloro-3-methylphenol   | SVOC         | mg/kg                | < 0.34                       | < 0.34                                 | < 0.34        |
| 4-Chloroaniline           | SVOC         | mg/kg                | < 0.34                       | < 0.34                                 | < 0.34        |
| 4-Methylphenol (p-Cresol) | SVOC         | mg/kg                | < 0.34                       | < 0.34                                 | < 0.34        |
| 4-Nitroaniline            | SVOC         | mg/kg                | < 0.67                       | < 0.68                                 | < 0.67        |
| 4-Nitrophenol             | SVOC         | mg/kg                | < 0.34                       | < 0.34                                 | < 0.34        |
| Acenaphthene              | PAH          | mg/kg                | < 0.34                       | < 0.34                                 | < 0.34        |
| Acenaphthylene            | PAH          | mg/kg                | < 0.34                       | < 0.34                                 | < 0.34        |
| Acifluorfen               | Herbicides   | mg/kg                | < 0.05                       | < 0.05                                 | < 0.05        |
| Actinium-228              |              | uCi/g                | 0.000000976                  | 0.000000795                            | < 0.000000582 |
| Alachlor                  | Herbicides   | mg/kg                | < 0.202                      | < 0.205                                | < 0.202       |
| Aldrin                    | Insecticides | mg/kg                | < 0.0505                     | < 0.0513                               | < 0.0505      |
| alpha-Chlordane           | Insecticides | mg/kg                | < 0.0505                     | < 0.0513                               | < 0.0505      |
| alpha-HCH (alpha-BHC)     | Insecticides | mg/kg                | < 0.0505                     | < 0.0513                               | < 0.0505      |
| Anthracene                | PAH          | mg/kg                | < 0.34                       | < 0.34                                 | < 0.34        |
| Aroclor 1016              | PCB          | mg/kg                | < 0.202                      | < 0.205                                | < 0.202       |
| Aroclor 1221              | PCB          | mg/kg                | < 0.202                      | < 0.205                                | < 0.202       |

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| DOEHRS Sample ID           |              |       | 000014DD                     | 000014EA             | 000014EB                               |
|----------------------------|--------------|-------|------------------------------|----------------------|--|
| Field/Local Sample ID      |              |       | IRA_COPPER_01S_09225         | IRA_COPPER_02S_09225 | IRA_COPPER_03S_09225                   |
| Site                       |              |       | Shona Track                  | Burn Pit             | Mobile Kitchen Trailer on main walkway |
| Start Date                 |              |       | 2009/08/13 0845              | 2009/08/13 0845      | 2009/08/13 0845                        |
| Parameter                  | Class        | Units | Concentration <sup>1,2</sup> |                      |  |
| Aroclor 1232               | PCB          | mg/kg | < 0.202                      | < 0.205              | < 0.202                                |
| Aroclor 1242               | PCB          | mg/kg | < 0.202                      | < 0.205              | < 0.202                                |
| Aroclor 1248               | PCB          | mg/kg | < 0.202                      | < 0.205              | < 0.202                                |
| Aroclor 1254               | PCB          | mg/kg | < 0.202                      | < 0.205              | < 0.202                                |
| Aroclor 1260               | PCB          | mg/kg | < 0.202                      | < 0.205              | < 0.202                                |
| Arsenic                    | Metals       | mg/kg | < 39.4                       | < 40.5               | < 39.7                                 |
| Aspon                      | Insecticides | mg/kg | < 0.101                      | < 0.103              | < 0.101                                |
| Atrazine                   | Herbicides   | mg/kg | < 2.02                       | < 2.05               | < 2.02                                 |
| Azinphos-ethyl             | Insecticides | mg/kg | < 0.202                      | < 0.205              | < 0.202                                |
| Azinphos-methyl            | Insecticides | mg/kg | < 0.202                      | < 0.205              | < 0.202                                |
| Barium                     | Metals       | mg/kg | 102                          | 79.7                 | 73.7                                   |
| Benefin                    | Herbicides   | mg/kg | < 0.101                      | < 0.103              | < 0.101                                |
| Bentazon                   | Herbicides   | mg/kg | < 0.05                       | < 0.05               | < 0.05                                 |
| Benz[a]anthracene          | PAH          | mg/kg | < 0.34                       | < 0.34               | < 0.34                                 |
| Benzo[a]pyrene             | PAH          | mg/kg | < 0.34                       | < 0.34               | < 0.34                                 |
| Benzo[b]fluoranthene       | PAH          | mg/kg | < 0.34                       | < 0.34               | < 0.34                                 |
| Benzo[g,h,i]perylene       | PAH          | mg/kg | < 0.34                       | < 0.34               | < 0.34                                 |
| Benzo[k]fluoranthene       | PAH          | mg/kg | < 0.34                       | < 0.34               | < 0.34                                 |
| Benzyl alcohol             | SVOC         | mg/kg | < 0.34                       | < 0.34               | < 0.34                                 |
| Beryllium                  | Metals       | mg/kg | < 1.97                       | < 2.02               | < 1.98                                 |
| beta-HCH (beta-BHC)        | Insecticides | mg/kg | < 0.0505                     | < 0.0513             | < 0.0505                               |
| Bis(2-chloroethoxy)methane | SVOC         | mg/kg | < 0.34                       | < 0.34               | < 0.34                                 |
| Bis(2-chloroethyl)ether    | SVOC         | mg/kg | < 0.34                       | < 0.34               | < 0.34                                 |

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| DOEHRS Sample ID             |              | 000014DD             | 000014EA                     | 000014EB                               |                 |
|------------------------------|--------------|----------------------|------------------------------|--|-----------------|
| Field/Local Sample ID        |              | IRA_COPPER_01S_09225 | IRA_COPPER_02S_09225         | IRA_COPPER_03S_09225                   |                 |
| Site                         |              | Shona Track          | Burn Pit                     | Mobile Kitchen Trailer on main walkway |                 |
| Start Date                   |              | 2009/08/13 0845      | 2009/08/13 0845              | 2009/08/13 0845                        |                 |
| Parameter                    | Class        | Units                | Concentration <sup>1,2</sup> |  |                 |
| Bis(2-chloroisopropyl) ether | SVOC         | mg/kg                | < 0.34                       | < 0.34                                 | < 0.34          |
| Bismuth-214                  |              | uCi/g                | 0.000000838                  | 0.000000606                            | 0.000000621     |
| Bolstar                      | Insecticides | mg/kg                | < 0.202                      | < 0.205                                | < 0.202         |
| Bromacil                     | Herbicides   | mg/kg                | < 0.404                      | < 0.41                                 | < 0.404         |
| Butylbenzylphthalate         | SVOC         | mg/kg                | < 0.34                       | < 0.34                                 | < 0.34          |
| Cadmium                      | Metals       | mg/kg                | 7.19                         | 5.06                                   | 7.24            |
| Carbophenothion              | Insecticides | mg/kg                | < 0.202                      | < 0.205                                | < 0.202         |
| Cesium-134                   |              | uCi/g                | < 0.0000000965               | < 0.0000000933                         | < 0.0000000869  |
| Cesium-137                   |              | uCi/g                | < 0.00000013200              | < 0.000000136                          | < 0.00000010200 |
| Chlordane, technical         | Insecticides | mg/kg                | < 0.202                      | < 0.205                                | < 0.202         |
| Chlorfenvinphos              | Insecticides | mg/kg                | < 0.101                      | < 0.103                                | < 0.101         |
| Chloroneb                    | Fungicides   | mg/kg                | < 0.252                      | < 0.256                                | < 0.253         |
| Chlorothalonil               | Fungicides   | mg/kg                | < 0.101                      | < 0.103                                | < 0.101         |
| Chlorpyrifos                 | Insecticides | mg/kg                | < 0.101                      | < 0.103                                | < 0.101         |
| Chlorpyrifos-methyl          | Insecticides | mg/kg                | < 0.101                      | < 0.103                                | < 0.101         |
| Chromium                     | Metals       | mg/kg                | 77                           | 54.2                                   | 79              |
| Chrysene                     | PAH          | mg/kg                | < 0.34                       | < 0.34                                 | < 0.34          |
| cis-Permethrin               | Insecticides | mg/kg                | < 0.404                      | < 0.41                                 | < 0.404         |
| Cobalt-60                    |              | uCi/g                | < 0.000000106                | < 0.000000088400                       | < 0.0000000912  |
| Coumaphos                    | Insecticides | mg/kg                | < 0.202                      | < 0.205                                | < 0.202         |
| Crotoxyphos                  | Insecticides | mg/kg                | < 0.202                      | < 0.205                                | < 0.202         |
| DCPA (Dacthal)               | Herbicides   | mg/kg                | < 0.101                      | < 0.103                                | < 0.101         |
| delta-HCH (delta-BHC)        | Insecticides | mg/kg                | < 0.0505                     | < 0.0513                               | < 0.0505        |

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13 Aug 09, U\_IRQ\_COPPER\_CM\_SQA\_20090813

| DOEHRS Sample ID          |              | 000014DD             | 000014EA                     | 000014EB                               |          |
|---------------------------|--------------|----------------------|------------------------------|--|----------|
| Field/Local Sample ID     |              | IRA_COPPER_01S_09225 | IRA_COPPER_02S_09225         | IRA_COPPER_03S_09225                   |          |
| Site                      |              | Shona Track          | Burn Pit                     | Mobile Kitchen Trailer on main walkway |          |
| Start Date                |              | 2009/08/13 0845      | 2009/08/13 0845              | 2009/08/13 0845                        |          |
| Parameter                 | Class        | Units                | Concentration <sup>1,2</sup> |  |          |
| Di(2-ethylhexyl)phthalate | SVOC         | mg/kg                | < 0.34                       | 6                                      | < 0.34   |
| Diazinon                  | Insecticides | mg/kg                | < 0.101                      | < 0.103                                | < 0.101  |
| Dibenz[a,h]anthracene     | PAH          | mg/kg                | < 0.34                       | < 0.34                                 | < 0.34   |
| Dibenzofuran              | SVOC         | mg/kg                | < 0.34                       | < 0.34                                 | < 0.34   |
| Dicamba                   | Herbicides   | mg/kg                | < 0.05                       | < 0.05                                 | < 0.05   |
| Dichlofenthion            | Insecticides | mg/kg                | < 0.101                      | < 0.103                                | < 0.101  |
| Dichloroprop              | Herbicides   | mg/kg                | < 0.05                       | < 0.05                                 | < 0.05   |
| Dichlorvos                | Insecticides | mg/kg                | < 0.202                      | < 0.205                                | < 0.202  |
| Dicloran                  | Fungicides   | mg/kg                | < 0.202                      | < 0.205                                | < 0.202  |
| Dieldrin                  | Insecticides | mg/kg                | < 0.0505                     | < 0.0513                               | < 0.0505 |
| Diethylphthalate          | SVOC         | mg/kg                | < 0.34                       | < 0.34                                 | < 0.34   |
| Dimethoate                | Insecticides | mg/kg                | < 0.404                      | < 0.41                                 | < 0.404  |
| Dimethylphthalate         | SVOC         | mg/kg                | 0.42                         | 0.93                                   | < 0.34   |
| Di-n-butylphthalate       | SVOC         | mg/kg                | < 0.34                       | 0.43                                   | < 0.34   |
| Di-n-octylphthalate       | SVOC         | mg/kg                | < 0.34                       | 1.4                                    | < 0.34   |
| Dinoseb                   | Herbicides   | mg/kg                | < 0.05                       | < 0.05                                 | < 0.05   |
| Disulfoton                | Insecticides | mg/kg                | < 0.202                      | < 0.205                                | < 0.202  |
| Endosulfan I              | Insecticides | mg/kg                | < 0.0505                     | < 0.0513                               | < 0.0505 |
| Endosulfan II             | Insecticides | mg/kg                | < 0.101                      | < 0.103                                | < 0.101  |
| Endosulfan sulfate        | Insecticides | mg/kg                | < 0.101                      | < 0.103                                | < 0.101  |
| Endrin                    | Insecticides | mg/kg                | < 0.0505                     | < 0.0513                               | < 0.0505 |
| EPN                       | Insecticides | mg/kg                | < 0.101                      | < 0.103                                | < 0.101  |
| Ethion                    | Insecticides | mg/kg                | < 0.101                      | < 0.103                                | < 0.101  |
| Ethoprop                  | Insecticides | mg/kg                | < 0.101                      | < 0.103                                | < 0.101  |

Deployment OEH Risk Characterization, Soil and Associated Dust Samples, Copper, Iraq,  
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| DOEHRS Sample ID               |              | 000014DD             | 000014EA                     | 000014EB                               |               |
|--------------------------------|--------------|----------------------|------------------------------|--|---------------|
| Field/Local Sample ID          |              | IRA_COPPER_01S_09225 | IRA_COPPER_02S_09225         | IRA_COPPER_03S_09225                   |               |
| Site                           |              | Shona Track          | Burn Pit                     | Mobile Kitchen Trailer on main walkway |               |
| Start Date                     |              | 2009/08/13 0845      | 2009/08/13 0845              | 2009/08/13 0845                        |               |
| Parameter                      | Class        | Units                | Concentration <sup>1,2</sup> |  |               |
| Etridiazole                    | Fungicides   | mg/kg                | < 0.202                      | < 0.205                                | < 0.202       |
| Europium-152                   |              | uCi/g                | < 0.00000033                 | < 0.00000032600                        | < 0.000000273 |
| Famphur                        | Insecticides | mg/kg                | < 0.202                      | < 0.205                                | < 0.202       |
| Fenarimol                      | Fungicides   | mg/kg                | < 0.0505                     | < 0.0513                               | < 0.0505      |
| Fenitrothion                   | Insecticides | mg/kg                | < 0.101                      | < 0.103                                | < 0.101       |
| Fensulfothion                  | Insecticides | mg/kg                | < 1.01                       | < 1.03                                 | < 1.01        |
| Fenthion                       | Insecticides | mg/kg                | < 0.202                      | < 0.205                                | < 0.202       |
| Fluchloralin                   | Herbicides   | mg/kg                | < 0.202                      | < 0.205                                | < 0.202       |
| Fluoranthene                   | PAH          | mg/kg                | < 0.34                       | < 0.34                                 | < 0.34        |
| Fluorene                       | PAH          | mg/kg                | < 0.34                       | < 0.34                                 | < 0.34        |
| Fonofos                        | Insecticides | mg/kg                | < 0.101                      | < 0.103                                | < 0.101       |
| gamma-Chlordane                | Insecticides | mg/kg                | < 0.0505                     | < 0.0513                               | < 0.0505      |
| gamma-HCH (gamma-BHC, Lindane) | Insecticides | mg/kg                | < 0.0505                     | < 0.0513                               | < 0.0505      |
| Heptachlor                     | Insecticides | mg/kg                | < 0.0505                     | < 0.0513                               | < 0.0505      |
| Heptachlor epoxide             | Insecticides | mg/kg                | < 0.0505                     | < 0.0513                               | < 0.0505      |
| Hexachlorobenzene              | SVOC         | mg/kg                | < 0.34                       | < 0.34                                 | < 0.34        |
| Hexachlorobutadiene            | VOC          | mg/kg                | < 0.34                       | < 0.34                                 | < 0.34        |
| Hexachlorocyclopentadiene      | SVOC         | mg/kg                | < 0.67                       | < 0.68                                 | < 0.67        |
| Hexachloroethane               | SVOC         | mg/kg                | < 0.34                       | < 0.34                                 | < 0.34        |
| Indeno[1,2,3-cd]pyrene         | PAH          | mg/kg                | < 0.34                       | < 0.34                                 | < 0.34        |
| Isazophos                      | Insecticides | mg/kg                | < 0.101                      | < 0.103                                | < 0.101       |
| Isufenphos                     | Insecticides | mg/kg                | < 0.101                      | < 0.103                                | < 0.101       |
| Isophorone                     | SVOC         | mg/kg                | < 0.34                       | < 0.34                                 | < 0.34        |

Deployment OEH Risk Characterization, Soil and Associated Dust Samples, Copper, Iraq,  
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| DOEHRS Sample ID            |              |       | 000014DD                     | 000014EA             | 000014EB                               |
|-----------------------------|--------------|-------|------------------------------|----------------------|--|
| Field/Local Sample ID       |              |       | IRA_COPPER_01S_09225         | IRA_COPPER_02S_09225 | IRA_COPPER_03S_09225                   |
| Site                        |              |       | Shona Track                  | Burn Pit             | Mobile Kitchen Trailer on main walkway |
| Start Date                  |              |       | 2009/08/13 0845              | 2009/08/13 0845      | 2009/08/13 0845                        |
| Parameter                   | Class        | Units | Concentration <sup>1,2</sup> |                      |  |
| Lead                        | Metals       | mg/kg | < 9.85                       | < 10.1               | < 9.92                                 |
| Leptophos                   | Insecticides | mg/kg | < 0.101                      | < 0.103              | < 0.101                                |
| Malathion                   | Insecticides | mg/kg | < 0.101                      | < 0.103              | < 0.101                                |
| MCPA                        | Herbicides   | mg/kg | < 5.0                        | < 5.0                | < 5.0                                  |
| MCPP                        | Herbicides   | mg/kg | < 5.0                        | < 5.0                | < 5.0                                  |
| Mercury                     | Metals       | mg/kg | 0.0134                       | < 0.0121             | 0.0159                                 |
| Methoxychlor                | Insecticides | mg/kg | < 1.01                       | < 1.03               | < 1.01                                 |
| Mevinphos                   | Insecticides | mg/kg | < 0.404                      | < 0.41               | < 0.404                                |
| Mirex                       | Insecticides | mg/kg | < 0.0505                     | < 0.0513             | < 0.0505                               |
| Naphthalene                 | PAH          | mg/kg | < 0.34                       | < 0.34               | < 0.34                                 |
| Nickel                      | Metals       | mg/kg | 122                          | 75.8                 | 125                                    |
| Nitrobenzene                | SVOC         | mg/kg | < 0.34                       | < 0.34               | < 0.34                                 |
| N-Nitrosodimethylamine      | SVOC         | mg/kg | < 0.34                       | < 0.34               | < 0.34                                 |
| N-Nitrosodiphenylamine      | SVOC         | mg/kg | < 0.34                       | < 0.34               | < 0.34                                 |
| N-Nitrosodipropylamine      | SVOC         | mg/kg | < 0.34                       | < 0.34               | < 0.34                                 |
| o,p'-DDD                    | Insecticides | mg/kg | < 0.0505                     | < 0.0513             | < 0.0505                               |
| o,p'-DDE                    | Insecticides | mg/kg | < 0.0505                     | < 0.0513             | < 0.0505                               |
| o,p'-DDT                    | Insecticides | mg/kg | < 0.0505                     | < 0.0513             | < 0.0505                               |
| Oxadiazon                   | Herbicides   | mg/kg | < 0.0505                     | < 0.0513             | < 0.0505                               |
| Oxychlorane                 | Insecticides | mg/kg | < 0.0505                     | < 0.0513             | < 0.0505                               |
| p,p'-DDD                    | Insecticides | mg/kg | < 0.0505                     | < 0.0513             | < 0.0505                               |
| p,p'-DDE                    | Insecticides | mg/kg | < 0.0505                     | < 0.0513             | < 0.0505                               |
| p,p'-DDT                    | Insecticides | mg/kg | < 0.0505                     | < 0.0513             | < 0.0505                               |
| Parathion-ethyl (Parathion) | Insecticides | mg/kg | < 0.101                      | < 0.103              | < 0.101                                |



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| DOEHRS Sample ID            |              |       | 000014DD                     | 000014EA             | 000014EB                               |
|-----------------------------|--------------|-------|------------------------------|----------------------|--|
| Field/Local Sample ID       |              |       | IRA_COPPER_01S_09225         | IRA_COPPER_02S_09225 | IRA_COPPER_03S_09225                   |
| Site                        |              |       | Shona Track                  | Burn Pit             | Mobile Kitchen Trailer on main walkway |
| Start Date                  |              |       | 2009/08/13 0845              | 2009/08/13 0845      | 2009/08/13 0845                        |
| Parameter                   | Class        | Units | Concentration <sup>1,2</sup> |                      |  |
| Parathion-methyl            | Insecticides | mg/kg | < 0.101                      | < 0.103              | < 0.101                                |
| p-Bromophenyl phenyl ether  | SVOC         | mg/kg | < 0.34                       | < 0.34               | < 0.34                                 |
| p-Chlorophenyl phenyl ether | SVOC         | mg/kg | < 0.34                       | < 0.34               | < 0.34                                 |
| Pentachloronitrobenzene     | Fungicides   | mg/kg | < 0.101                      | < 0.103              | < 0.101                                |
| Pentachlorophenol           | SVOC         | mg/kg | < 0.34                       | < 0.34               | < 0.34                                 |
| Permethrin, trans-          | Insecticides | mg/kg | < 0.404                      | < 0.41               | < 0.404                                |
| Phenanthrene                | PAH          | mg/kg | < 0.34                       | < 0.34               | < 0.34                                 |
| Phenol                      | SVOC         | mg/kg | < 0.34                       | 0.35                 | < 0.34                                 |
| Phorate                     | Insecticides | mg/kg | < 0.404                      | < 0.41               | < 0.404                                |
| Phosmet                     | Insecticides | mg/kg | < 0.202                      | < 0.205              | < 0.202                                |
| Picloram                    | Herbicides   | mg/kg | < 0.05                       | < 0.05               | < 0.05                                 |
| Procymidone                 | Fungicides   | mg/kg | < 0.202                      | < 0.205              | < 0.202                                |
| Pronamide                   | Herbicides   | mg/kg | < 0.404                      | < 0.41               | < 0.404                                |
| Propazine                   | Herbicides   | mg/kg | < 2.02                       | < 2.05               | < 2.02                                 |
| Propetamphos                | Insecticides | mg/kg | < 0.101                      | < 0.103              | < 0.101                                |
| Protactinium-234M           |              | uCi/g | < 0.000013300                | < 0.000014900        | < 0.000010300                          |
| Protothiophos               | Insecticides | mg/kg | < 0.202                      | < 0.205              | < 0.202                                |
| Pyrene                      | SVOC         | mg/kg | < 0.34                       | < 0.34               | < 0.34                                 |
| Ronnel                      | Insecticides | mg/kg | < 0.101                      | < 0.103              | < 0.101                                |
| Selenium                    | Metals       | mg/kg | < 9.85                       | < 10.1               | < 9.92                                 |
| Silver                      | Metals       | mg/kg | < 1.97                       | < 2.02               | < 1.98                                 |
| Simazine                    | Herbicides   | mg/kg | < 2.02                       | < 2.05               | < 2.02                                 |
| Strontium                   | Metals       | mg/kg | 285                          | 424                  | 278                                    |

Deployment OEH Risk Characterization, Soil and Associated Dust Samples, Copper, Iraq,  
13 Aug 09, U\_IRQ\_COPPER\_CM\_SQA\_20090813

| DOEHRS Sample ID      |                | 000014DD             | 000014EA                     | 000014EB                               |               |
|-----------------------|----------------|----------------------|------------------------------|--|---------------|
| Field/Local Sample ID |                | IRA_COPPER_01S_09225 | IRA_COPPER_02S_09225         | IRA_COPPER_03S_09225                   |               |
| Site                  |                | Shona Track          | Burn Pit                     | Mobile Kitchen Trailer on main walkway |               |
| Start Date            |                | 2009/08/13 0845      | 2009/08/13 0845              | 2009/08/13 0845                        |               |
| Parameter             | Class          | Units                | Concentration <sup>1,2</sup> |  |               |
| Sulfotep              | Insecticides   | mg/kg                | < 0.101                      | < 0.103                                | < 0.101       |
| Terbufos              | Insecticides   | mg/kg                | < 0.101                      | < 0.103                                | < 0.101       |
| Tetrachlorvinphos     | Insecticides   | mg/kg                | < 0.202                      | < 0.205                                | < 0.202       |
| Thorium-234           |                | uCi/g                | < 0.00000146                 | < 0.0000014500                         | < 0.00000122  |
| Total solids          | Characteristic | %                    | 99.1                         | 97.5                                   | 99            |
| Toxaphene             | Insecticides   | mg/kg                | < 1.01                       | < 1.03                                 | < 1.01        |
| trans-Nonachlor       | Insecticides   | mg/kg                | < 0.0505                     | < 0.0513                               | < 0.0505      |
| Trichloronate         | Insecticides   | mg/kg                | < 0.202                      | < 0.205                                | < 0.202       |
| Trifluralin           | Herbicides     | mg/kg                | < 0.101                      | < 0.103                                | < 0.101       |
| Uranium-235           |                | uCi/g                | < 0.000000751                | < 0.00000068400                        | < 0.000000609 |
| Vinclozolin           | Fungicides     | mg/kg                | < 0.202                      | < 0.205                                | < 0.202       |
| Zinophos              | Insecticides   | mg/kg                | < 0.101                      | < 0.103                                | < 0.101       |

<sup>1</sup> < X.XX = Below laboratory reporting limit (X.XX)

<sup>2</sup>Laboratory reporting limit is parameter and sample specific

LEGEND:

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

SVOC = semivolatle organic compound

VOC = volatile organic compound

PAH = polycyclic aromatic hydrocarbon

PCB = polychlorinated biphenyl

mg/kg = milligrams per kilogram

μCi/g = micro curies per gram