DEPARTMENT OF THE ARMY
US ARMY PUBLIC HEALTH COMMAND (PROVISIONAL)
5158 BLACKHAWK ROAD
ABERDEEN PROVING GROUND, MD 21010-5403

MCHB-TS-RDE

22 JAN 2010

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 Particulate Matter Samples, Taji, Iraq, 5 September-9 November 2009, U_IRQ_TAJI_CM_A10_20091109

1. The enclosed assessment details the occupational and environmental health (OEH) risk characterization for ambient air particulate matter samples collected by 705th Military Police Battalion and the 61st Medical Detachment personnel, Taji, Iraq, 5 September-9 November 2009. Forty of forty five filters submitted are valid samples.

2. The OEH risk estimate for exposure to particulate matter less than 10 micrometers in diameter (PM_{10}) and metals in the ambient air at Taji, Iraq on the sampled dates 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)
224th MED DET (Commander/MAJ (b) (6))
224th MED DET (XO/CPT (b) (6))
705th MP BN (Environmental Science and Safety Officer/(b) (6))
MNC-I (Command Surgeon Office/LTC (b) (6))
MNF-I CJ148 (Commander/CDR (b) (6))
ARCENT (Command Surgeon Office/LTC (b) (6))
ARCENT (Force Health Protection Officer/LTC (b) (6))
CFLCC/USA 3RD MDSC (MAJ (b) (6))
1st MED BDE (Environmental Science Officer/SFC (b) (6))
1st MED BDE (Environmental Science Officer/MSG (b) (6))
1st MED BDE (Environmental Science Officer/CPT (b) (6))
(CONT)

CF: (w/encl)(CONT)
118th MMB (FHP ESO/MAJ (b) (6)
61st MMB (Preventive Medicine OIC/CPT (b) (6)
61st MMB (Preventive Medicine NCO/SSG (b) (6)
227th MED DET PM (Commander/MAJ (b) (6)
1st CD (Command Surgeon Office/MAJ (b) (6)
USAPHC-EUR (MCHB-AE-EE/CPT (b) (6)

U.S. Army Public Health Command
(Provisional)

USAPHC

DEPLOYMENT OCCUPATIONAL AND ENVIRONMENTAL
HEALTH RISK CHARACTERIZATION
AMBIENT AIR PARTICULATE MATTER SAMPLES
TAJI, IRAQ
5 SEPTEMBER-9 NOVEMBER 2009
U_IRQ_TAJI_CM_A10_20091109

Preventive Medicine Survey: 40-5f1

DEPLOYMENT OCCUPATIONAL AND ENVIRONMENTAL
HEALTH RISK CHARACTERIZATION
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TAJI, IRAQ
5 SEPTEMBER-9 NOVEMBER 2009
U_IRQ_TAJI_CM_A10_20091109

1. REFERENCES. See Appendix A for a list of references.

2. PURPOSE AND SCOPE. This occupational and environmental health (OEH) risk characterization addresses the analytical results for particulate matter less than 10 micrometers in diameter (PM_{10}) and metals ambient air samples collected on 5 September-9 November 2009 at Taji, Iraq in accordance with U.S. Department of Defense (DOD) medical surveillance requirements. Forty of forty five filters submitted are valid samples. This sample set was assessed using the methodology described in Appendix B. This report should not be considered a complete assessment of the overall OEH hazards to which troops may be exposed at Taji, Iraq.

3. BACKGROUND AND EXPOSURE ASSUMPTIONS. Ambient air PM_{10} and metals samples were collected at Building 703, the Soldier housing unit (SHU), the Modular Detainee Housing Unit (MDHU), the Dining Facility (DFAC), the Burn Pit Café and Spartan Gate, Taji, Iraq, 5 September-9 November 2009. All samples, excluding the samples taken at Building 703, were reported to be taken near an active burn pit. There is no known industry present in the vicinity. No weather conditions were reported for the sampling event. All personnel are expected to remain at this location for greater than 1 year. A conservative (protective) assumption is that all personnel inhale the ambient air for 24 hours/day for 365 days (1 year). In addition, it is assumed that control measures and/or personal protective equipment are not used.

4. SAMPLE COLLECTION AND ANALYSIS.

a. Sample Collection. This ambient air PM_{10} and metals sample set was collected using the Deployment Particulate Sampler (DPS™) apparatus. Appendix C presents a summary of the PM filters submitted by the units and reason for invalid samples. (DPS™ is a registered trademark of SKC, Inc.)

b. Laboratory Analysis. The U.S. Army Public Health Command (Provisional) (USAPHC (Prov)) laboratory weighs the ambient air PM filters to determine PM mass and calculate a concentration. The USAPHC (Prov) laboratory analyzes the filters to determine metals concentrations. Detected metals identified above the laboratory reportable limit were compared to Military Exposure Guidelines (MEGs) presented in U.S. Army Center for Health Promotion and Preventive Medicine Technical Guide 230,

while PM_{10} concentrations were assessed using the process described in the Method section, Appendix B. Appendix C presents a summary of the filters assessed in this report. Appendix D presents a sample results summary table. Appendices E-K present complete analytical results.

5. HAZARD IDENTIFICATION.

a. The PM. Since PM was measured at a concentration above the Air Quality Index good range, PM is identified as a potential health threat requiring further assessment. The PM air pollutants include solid particles and liquid droplets, emitted directly into the air by sources, such as, power plants, motor vehicles, aircraft, generators, construction activities, fires, and natural windblown dust. The PM can include dust, silica, soil, metals, organic compounds, allergens, and compounds, such as, nitrates or sulfates that are formed by condensation or transformation of combustion exhaust. The PM chemical composition and size vary considerably depending on the source.

b. Metals. No detected metals were found at concentrations greater than their respective MEGs. Therefore, the OEH risk estimate for exposure to metals in the ambient air at this location is considered **low**.

6. HAZARD ASSESSMENT.

a. Hazard Severity. The average concentration of PM_{10} was 257 micrograms per cubic meter ($\mu g/m^3$). This concentration falls within the range of concentrations that are believed to pose significant health concerns to susceptible groups, which in the military can include asthmatics or persons with pre-existing cardiopulmonary disease. Otherwise, generally healthy troops may have some eye, nasal, or throat irritation causing little or no impact on unit readiness. Therefore, the hazard severity is considered negligible.

b. Hazard Probability. Although the average PM_{10} sample concentration was within the negligible severity range, it is important to examine the individual samples to determine whether the average concentration is dominated by outliers or if it is representative of a typical exposure. The probability that the severity of a hazard is negligible is based on a comparison of individual sample concentrations to the PM_{10} 24-hour NAAQS of 150 $\mu g/m^3$. During this sampling event, the range of PM_{10} sample concentrations was 48-1,700 $\mu g/m^3$, and 31 of 40 (78 percent) of samples were above 150 $\mu g/m^3$; therefore, the probability that personnel in the sampled area will be exposed to PM_{10} greater than 150 $\mu g/m^3$ is considered likely.

c. Risk Estimate and Confidence. Table 1 summarizes the risk estimate for each identified hazard.

Table 1. Risk Estimate Summary for Exposure to PM_{10} in the Ambient Air, Taji, Iraq, 5 September-9 November 2009

Parameter	Hazard Severity	Hazard Probability	Hazard-Specific Risk Estimate	Operational Risk Estimate	Confidence
PM_{10}	Negligible	Likely	LOW	LOW	LOW
Metals	No parameters detected above a MEG		LOW		

7. CONCLUSION. The OEH risk estimate for exposure to PM_{10} in the ambient air at Taji, Iraq, 5 September-9 November 2009 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.

8. RECOMMENDATIONS AND NOTES.

a. Recommendations.

(1) Collect PM samples from this location at least once every 6 days (if possible) for the deployment duration (or as long as possible) to better characterize the ambient air PM and metals exposures.

(2) Restrict outdoor physical activities where possible during periods of visibly high particulate levels.

b. Notes.

(1) This OEH risk assessment is specific to the exposure assumptions identified above and the sample results assessed in this report. If the assumed exposure scenario changes or additional information is available, provide the updated information so that the risk estimate can be reassessed. If additional samples from this site and/or area are collected, a new OEH risk assessment will be completed.

(2) As part of a Comprehensive Military Medical Surveillance Program, required by Department of Defense Directive (DoDD) 6490.02E and Department of Defense Instruction (DoDI) 6490.03, this report has been submitted to the Occupational and Environmental Health Surveillance - Data Portal (OEHS-DP). You can view this and other archived OEHS data at https://doehrswww.apgea.army.mil/doehrs-oehs/. If you have additional OEHS data for this location it can also be submitted via this Web site.

9. POINTS OF CONTACT. The USAPHC (Prov) 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); 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

REFERENCES

1. Department of Defense Directive (DoDD) 6490.02E, Comprehensive Health Surveillance, 21 October 2004.

2. Department of Defense Instruction (DoDI) 6490.03, Deployment Health, 11 August 2006.

3. Field Manual (FM) 5-19, Composite Risk Management, 21 August 2006.

4. 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.

5. Memorandum, USACHPPM (MCHB-TS-RDE), 27 April 2007, Subject: Deployment Operational Risk Characterization Method for Particulate Matter (PM).

APPENDIX B

METHODOLOGY

B-1. SCOPE OF RISK ASSESSMENTS. The U.S. Army Public Health Command (Provisional (USAPHC (Prov)) Deployment Environmental Surveillance Program (DESP) characterizes deployment OEH risks which may impact mission capability (that is, operational risks). Each characterization is performed using risk management doctrine (FM 5-19), and the relatively conservative (protective) assumptions and methods provided in the U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) Technical Guide (TG) 230, to facilitate decision making that can minimize the likelihood of significant risks. A risk estimate is generated for each sample or sample set sent to the USAPHC (Prov) laboratory for analysis. These risk estimates are provided to preventive medicine personnel with information about potential operational risks and associated health effects. The samples received are generally limited in time, area, and media. Therefore, any risk characterization based on a sample or sample set should not be considered a complete characterization of the overall OEH hazards to which troops may be exposed at a location.

B-2. RISK ASSESSMENT METHODOLOGY.

a. General. USACHPPM TG 230 methodology (identification of the hazard(s), assessment of the hazard severity and probability, and determination of a risk estimate and confidence level) with the USACHPPM TG 230 military exposure guidelines (MEGs) and National Ambient Air Quality Standards (NAAQS) are used to characterize the risk from identified OEH hazards. Each component of the methodology is described in more detail below.

b. Hazard Identification.

(1) Hazard Definition. For the purpose of conducting these risk assessments, an OEH hazard is any biological, chemical, or physical parameter detected in a medium, by field testing or laboratory analysis. The detected parameter could pose a health threat if personnel are exposed to it at levels greater than its respective MEG.

(2) Screening the Hazards.

a. General. The USAPHC (Prov) DESP uses the TG 230 methodology as expanded in Reference (1d) and associated MEGs to assess identified hazards and estimate risk in a manner consistent with doctrinal risk management procedures and terminology. This method includes identification of the hazard(s), assessment of the hazard severity and probability, and determination of a risk estimate and associated level of confidence.

As part of the hazard identification step, the long-term (1-year) MEGs are used as screening criteria to identify those hazards that are potential health threats. These 1-year MEGs represent exposure concentrations at or below which no significant health effects (including delayed or chronic disease or significant increased risk of cancer) are anticipated even after 1 year of continuous daily exposures. Short-term MEGs are used to assess brief one time or intermittent exposures. The underlying toxicological basis for the MEGs is addressed in U.S. Army Center for Health Promotion and Preventive Medicine Reference Document 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 operational risk management methodology. Hazards that are either not detected or are present only at levels below the 1-year MEGs are not considered health threats; therefore, are automatically assigned a low operational risk estimate.

b. Assessment of Ambient Air Particulate Matter. The particulate matter (PM) is one of six air pollutants for which the U.S. Environmental Protection Agency (USEPA) has promulgated NAAQS in the interest of protecting public health. In addition, the USEPA developed the Air Quality Index (AQI) to communicate daily air quality to the public using six descriptive categories ranging from “good” to “hazardous.” The AQI categories for PM are based on concentration ranges that are grouped according to the severity of health concerns. The USAPHC (Prov) uses the AQI categories to characterize the operational risk from PM. If any PM sample concentration is above the threshold of the AQI good quality air category, it is identified as a hazard. Hazard severity is determined by comparing the average PM concentration for a specific location and timeframe to PM concentration ranges identified as either negligible or marginal. Negligible concentration levels correspond to mild respiratory effects among generally healthy troops, with more significant effects among sensitive persons, such as, asthmatics or those with existing cardiopulmonary disease. Marginal concentration levels are expected to pose more significant health effects among both healthy personnel, and those with preexisting sensitivities. Hazard probability is based on the frequency that anticipated exposures are above a threshold that is representative of the hazard severity category.

APPENDIX C

INFORMATION SUMMARY
AMBIENT AIR SAMPLES
TAJI, IRAQ
5 SEPTEMBER-9 NOVEMBER 2009

DOEHRS Sample ID	Field/Local Sample ID	Site	Start Date/Time	Sample Duration	Reason Sample was Invalid	Filter ID
000018RS	IRQTAJI09248PM10MV	Building 703	2009/09/05 1100	1440.0 minutes		47-08-1058
0000187A	IRQ_TAJI_09248_PM10DPS	Building 703	2009/09/05 1730	1440.0 minutes		47-08-1059
000018RR	IRQTAJIMINIVOL09255	Building 703	2009/09/11 2145	1440.0 minutes		47-08-1061
00001H6B	IRQ_TAJI_09264_PM10DPS	Building 703	2009/09/21 1300	1440.0 minutes		47-08-1067
00001H6I	IRQ_TAJI_PM10MV_09268	Building 703	2009/09/25 1400	1440.0 minutes		47-09-0440
00001H6L	IRQ_TAJI_09283_01A	Building 703	2009/10/10 1040	1440.0 minutes		47-09-0974
00001CAY	IRQ CPTAJI 09287 PM10	SHU	2009/10/14 1345	1440.0 minutes		47-09-1460
00001CB6	IRQ CPTAJI 09287 PM10	MDHU	2009/10/14 1609	1440.0 minutes		47-09-1475
00001CB9	IRQ CPTAJI 09287 PM10	DFAC	2009/10/14 1614	1440.0 minutes		47-09-1486
00001CBE	IRQ CPTAJI 09287 PM10	Spartan Gate	2009/10/14 1622	941.0 minutes	Sampler Malfunction	47-09-1493
00001CBC	IRQ CPTAJI 09287 PM10	Burn Pit Cafe	2009/10/14 1739	1440.0 minutes		47-09-1488
00001H6Y	IRQ_TAJI_09289_PM10MV	Building 703	2009/10/16 1100	1440.0 minutes		47-08-0574
00001E8N	IRQ CPTAJI 0291 PM10	Spartan Gate	2009/10/18 0920	1440.0 minutes		47-09-1487
00001870	IRQ CPTAJI 09291 PM10	SHU	2009/10/18 0924	1440.0 minutes		47-09-1470
00001E8B	IRQ CPTAJI 09291 PM10	DFAC	2009/10/18 0935	1440.0 minutes		47-09-1471
00001E8G	IRQ CPTAJI 09291 PM10	MDHU	2009/10/18 0939	1440.0 minutes		47-09-1472
00001E7X	IRQ CPTAJI 09291 PM10	Burn Pit Cafe	2009/10/18 0941	1413.0 minutes		47-09-1464

Deployment OEH Risk Characterization, Ambient Air PM Samples, Taji, Iraq, 5 Sep-9 Nov 09, U_IRQ_TAJI_CM_A10_20091109

DOEHRS Sample ID	Field/Local Sample ID	Site	Start Date/Time	Sample Duration	Reason Sample was Invalid	Filter ID
00001F3E	IRQCPTAJI10294PM10	SHU	2009/10/21 0749	1440.0 minutes		47-09-1490
00001F3H	IRQCPTAJI10294PM10	DFAC	2009/10/21 0752	1440.0 minutes		47-09-1489
00001F3U	IRQCPTAJI10294PM10	MDHU	2009/10/21 0803	1440.0 minutes		47-09-1498
00001F47	IRQCPTAJI10294PM10	Spartan Gate	2009/10/21 0803	1440.0 minutes		47-09-1491
00001F4K	IRQCPTAJI10294PM10	Burn Pit Cafe	2009/10/21 0811	1440.0 minutes	Battery Failure	47-09-1467
00001GUW	IRQCPTAJI10298 PM10	SHU	2009/10/25 0911	1440.0 minutes		47-09-1495
00001GV0	IRQCPTAJI10298 PM10	Spartan Gate	2009/10/25 0917	1440.0 minutes		47-09-1462
00001GV3	IRQCPTAJI10298 PM10	DFAC	2009/10/25 0924	1440.0 minutes		47-09-1465
00001GV6	IRQCPTAJI10298 PM10	SHU	2009/10/25 0928	1440.0 minutes		47-09-1492
00001GV7	IRQCPTAJI10298 PM10	Burn Pit Cafe	2009/10/25 0930	1440.0 minutes		47-09-1474
00001GV9	IRQCPTAJI10301 PM10	DFAC	2009/10/28 1406	1440.0 minutes		47-09-1466
00001GVA	IRQCPTAJI10301 PM10	Burn Pit Cafe	2009/10/28 1411	1440.0 minutes		47-09-1468
00001H76	IRQ_TAJI_PM10MV_09303	Building 703	2009/10/30 1000	1440.0 minutes		47-09-0971
00001I7W	IRQCPTAJI09305PM10DPS	Spartan Gate	2009/11/01 1138	1447.0 minutes	Battery Failure	47-09-1459
00001H7A	IRQ_TAJI_09306_01A	Building 703	2009/11/01 1149	1440.0 minutes		47-09-0442
00001I7S	IRQCPTAJI09305PM10DPS	MDHU	2009/11/01 1152	1440.0 minutes		47-09-1497
00001I7V	IRQCPTAJI09306PM10DPS	SHU	2009/11/02 1430	1440.0 minutes		47-09-1499
00001IXU	IRQCATAJI09309PM10-1	SHU	2009/11/05 1602	1440.0 minutes		47-09-2198
00001IXW	IRQCATAJI09309PM10-2	Spartan Gate	2009/11/05 1608	1440.0 minutes		47-09-2199
00001IYB	IRQCATAJI09309PM10-3	MDHU	2009/11/05 1620	842.0 minutes	Battery Failure	47-09-2200
00001IXY	IRQCATAJI09310PM10-1	SHU	2009/11/06 1400	1440.0 minutes		47-09-2195
00001IY3	IRQCATAJI09310PM10-2	Burn Pit Cafe	2009/11/06 1445	1440.0 minutes		47-09-2196

Deployment OEH Risk Characterization, Ambient Air PM Samples, Taji, Iraq, 5 Sep-9 Nov 09, U_IRQ_TAJI_CM_A10_20091109

DOEHRS Sample ID	Field/Local Sample ID	Site	Start Date/Time	Sample Duration	Reason Sample was Invalid	Filter ID
00001JLO	IRQCPTAJI109311	SHU	2009/11/07 1513	1440.0 minutes		47-09-2194
00001JLT	IRQCPTAJI109311	Spartan Gate	2009/11/07 1521	1440.0 minutes		47-09-2193
00001JM0	IRQCPTAJI109312 PM10	SHU	2009/11/08 1022	1440.0 minutes		47-09-2189
00001JN3	IRQCPTAJI109312PM10	Burn Pit Cafe	2009/11/08 1022	1358.0 minutes	Battery Failure	47-09-2190
00001JM9	IRQCPTAJI109313PM10	SHU	2009/11/09 1020	1440.0 minutes		47-09-2187
00001JMQ	IRQCPTAJI109313PM10	DFAC	2009/11/09 1052	1440.0 minutes		47-09-2186

LEGEND:
DOEHRS Sample ID = Defense Occupational and Environmental Health Readiness System Sample Identification Number
DFAC = Dining Facility
SHU = Soldier housing unit
MDHU = Modular Detainee Housing Unit

APPENDIX D

RESULTS SUMMARY
AMBIENT AIR SAMPLES
TAJI, IRAQ
5 SEPTEMBER-9 NOVEMBER 2009

Parameter	Units	Concentration		Valid Samples		USACHPPM TG230 Military Exposure Guidelines (MEGs) 1-year	
		Maximum	Average	#	# > Laboratory Reporting Limit	# > MEG	MEG
Chromium	µg/m^3	0.052917	0.020796	40	1	0	12
Lead	µg/m^3	6.0346	0.27787	40	12	0	12
Manganese	µg/m^3	0.64167	0.097944	40	3	0	3.4
Nickel	µg/m^3	0.063681	0.021065	40	1	0	37
PM_{10}	µg/m^3	1700	257	40	40	39	50
Zinc	µg/m^3	0.64924	0.20796	40	1	0	2400

LEGEND:
DOEHRS Sample ID = Deployment Occupational and Environmental Health Readiness System Sample Identification Number
µg/m^3 = micrograms per cubic meter

APPENDIX E

ANALYTICAL SAMPLE RESULTS
AMBIENT AIR SAMPLES
TAJI, IRAQ
5 SEPTEMBER-9 NOVEMBER 2009

DOEHRS Sample ID			0000187A	000018RR	000018RS	00001CAY	00001CB6	00001CB9
Field/Local Sample ID			IRQ_TAJI_09248 _PM10DPS	IRQTAJIMINIVOL 09255	IRQTAJI09248 PM10MV	IRQ CPTAJI 09287 PM10	IRQ CPTAJI 09287 PM10	IRQ CPTAJI 09287 PM10
Site			Building 703	Building 703	Building 703	SHU	MDHU	DFAC
Start Date			2009/09/05 1730	2009/09/11 2145	2009/09/05 1100	2009/10/14 1345	2009/10/14 1609	2009/10/14 1614
Parameter	Class	Units	Concentration[1,2]					
Antimony	Metals	$\mu g/m^3$	< 0.069444	< 0.11740	< 0.12479	< 0.069444	< 0.069444	< 0.069444
Arsenic	Metals	$\mu g/m^3$	< 0.034722	< 0.058702	< 0.062394	< 0.034722	< 0.034722	< 0.034722
Beryllium	Metals	$\mu g/m^3$	< 0.034722	< 0.058702	< 0.062394	< 0.034722	< 0.034722	< 0.034722
Cadmium	Metals	$\mu g/m^3$	< 0.034722	< 0.058702	< 0.062394	< 0.034722	< 0.034722	< 0.034722
Chromium	Metals	$\mu g/m^3$	< 0.034722	< 0.058702	< 0.062394	< 0.034722	< 0.034722	< 0.034722
Lead	Metals	$\mu g/m^3$	< 0.069444	6.0346	< 0.12479	< 0.069444	< 0.069444	< 0.069444
Manganese	Metals	$\mu g/m^3$	< 0.13889	< 0.23481	< 0.24958	< 0.13889	< 0.13889	< 0.13889
Nickel	Metals	$\mu g/m^3$	< 0.034722	< 0.058702	< 0.062394	< 0.034722	< 0.034722	< 0.034722
PM_{10}		$\mu g/m^3$	95	188	116	242	275	57
Vanadium	Metals	$\mu g/m^3$	< 0.13889	< 0.23481	< 0.24958	< 0.13889	< 0.13889	< 0.13889
Zinc	Metals	$\mu g/m^3$	< 0.34722	0.64924	< 0.62394	< 0.34722	< 0.34722	< 0.34722

[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
$\mu g/m^3$ = micrograms per cubic meter
SHU = Soldier housing unit
MDHU = Modular Detainee Housing Unit
DFAC = Dining Facility

APPENDIX F

ANALYTICAL SAMPLE RESULTS
AMBIENT AIR SAMPLES
TAJI, IRAQ
5 SEPTEMBER-9 NOVEMBER 2009

DOEHRS Sample ID			00001CBC	00001E7X	00001870	00001E8B	00001E8G	00001E8N
Field/Local Sample ID			IRQ CPTAJI 09287 PM10	IRQ CPTAJI 09291 PM10	IRQ CPTAJI 09291 PM10	IRQ CPTAJI 09291 PM10	IRQ CPTAJI 09291 PM10	IRQ CPTAJI 0291 PM10
Site			Burn Pit	Burn Pit	SHU	DFAC	MDHU	Spartan Gate
Start Date			2009/10/14 1739	2009/10/18 0941	2009/10/18 0924	2009/10/18 0935	2009/10/18 0939	2009/10/18 0920
Parameter	Class	Units	Concentration[1,2]					
Antimony	Metals	µg/m^3	< 0.069444	< 0.070771	< 0.069444	< 0.069444	< 0.069444	< 0.069444
Arsenic	Metals	µg/m^3	< 0.034722	< 0.035386	< 0.034722	< 0.034722	< 0.034722	< 0.034722
Beryllium	Metals	µg/m^3	< 0.034722	< 0.035386	< 0.034722	< 0.034722	< 0.034722	< 0.034722
Cadmium	Metals	µg/m^3	< 0.034722	< 0.035386	< 0.034722	< 0.034722	< 0.034722	< 0.034722
Chromium	Metals	µg/m^3	< 0.034722	< 0.035386	< 0.034722	< 0.034722	< 0.034722	< 0.034722
Lead	Metals	µg/m^3	< 0.069444	< 0.070771	< 0.069444	< 0.069444	< 0.069444	< 0.069444
Manganese	Metals	µg/m^3	< 0.13889	< 0.14154	< 0.13889	< 0.13889	< 0.13889	< 0.13889
Nickel	Metals	µg/m^3	< 0.034722	< 0.035386	< 0.034722	< 0.034722	< 0.034722	< 0.034722
PM_{10}		µg/m^3	230	195	115	195	168	198
Vanadium	Metals	µg/m^3	< 0.13889	< 0.14154	< 0.13889	< 0.13889	< 0.13889	< 0.13889
Zinc	Metals	µg/m^3	< 0.34722	< 0.35386	< 0.34722	< 0.34722	< 0.34722	< 0.34722

[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
SHU = Soldier housing unit
MDHU = Modular Detainee Housing Unit
DFAC = Dining Facility

APPENDIX G

ANALYTICAL SAMPLE RESULTS
AMBIENT AIR SAMPLES
TAJI, IRAQ
5 SEPTEMBER-9 NOVEMBER 2009

DOEHRS Sample ID			00001F3E	00001F3H	00001F3U	00001F47	00001GUW	00001GV0
Field/Local Sample ID			IRQCPTAJI 10294PM10	IRQCPTAJI 10294PM10	IRQCPTAJI 10294PM10	IRQCPTAJI 10294PM10	IRQCPTAJI 10298 PM10	IRQCPTAJI 10298 PM10
Site			SHU	DFAC	MDHU	Spartan Gate	SHU	Spartan Gate
Start Date			2009/10/21 0749	2009/10/21 0752	2009/10/21 0803	2009/10/21 0803	2009/10/25 0911	2009/10/25 0917
Parameter	Class	Units	Concentration[1,2]					
Antimony	Metals	µg/m^3	< 0.069444	< 0.069444	< 0.069444	< 0.069444	< 0.069444	< 0.069444
Arsenic	Metals	µg/m^3	< 0.034722	< 0.034722	< 0.034722	< 0.034722	< 0.034722	< 0.034722
Beryllium	Metals	µg/m^3	< 0.034722	< 0.034722	< 0.034722	< 0.034722	< 0.034722	< 0.034722
Cadmium	Metals	µg/m^3	< 0.034722	< 0.034722	< 0.034722	< 0.034722	< 0.034722	< 0.034722
Chromium	Metals	µg/m^3	< 0.034722	< 0.034722	< 0.034722	< 0.034722	< 0.034722	< 0.034722
Lead	Metals	µg/m^3	< 0.069444	< 0.069444	< 0.069444	< 0.069444	0.081944	0.073611
Manganese	Metals	µg/m^3	0.14444	< 0.13889	< 0.13889	0.15486	< 0.13889	< 0.13889
Nickel	Metals	µg/m^3	< 0.034722	< 0.034722	< 0.034722	< 0.034722	< 0.034722	< 0.034722
PM_{10}		µg/m^3	272	265	231	261	253	193
Vanadium	Metals	µg/m^3	< 0.13889	< 0.13889	< 0.13889	< 0.13889	< 0.13889	< 0.13889
Zinc	Metals	µg/m^3	< 0.34722	< 0.34722	< 0.34722	< 0.34722	< 0.34722	< 0.34722

[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
SHU = Soldier housing unit
MDHU = Modular Detainee Housing Unit
DFAC = Dining Facility

APPENDIX H

ANALYTICAL SAMPLE RESULTS
AMBIENT AIR SAMPLES
TAJI, IRAQ
5 SEPTEMBER-9 NOVEMBER 2009

DOEHRS Sample ID			00001GV3	00001GV6	00001GV7	00001GV9	00001GVA	00001H6B
Field/Local Sample ID			IRQCPTAJI 10298 PM10	IRQCPTAJI 10298 PM10	IRQCPTAJI 10298 PM10	IRQCPTAJI 10301 PM10	IRQCPTAJI 10301 PM10	IRQ_TAJI_09264 _PM10DPS
Site			DFAC	SHU	Burn Pit	DFAC	Burn Pit	Building 703
Start Date			2009/10/25 0924	2009/10/25 0928	2009/10/25 0930	2009/10/28 1406	2009/10/28 1411	2009/09/21 1300
Parameter	Class	Units	Concentration[1,2]					
Antimony	Metals	µg/m^3	< 0.069444	< 0.069444	< 0.069444	< 0.069444	< 0.069444	< 0.069444
Arsenic	Metals	µg/m^3	< 0.034722	< 0.034722	< 0.034722	< 0.034722	< 0.034722	< 0.034722
Beryllium	Metals	µg/m^3	< 0.034722	< 0.034722	< 0.034722	< 0.034722	< 0.034722	< 0.034722
Cadmium	Metals	µg/m^3	< 0.034722	< 0.034722	< 0.034722	< 0.034722	< 0.034722	< 0.034722
Chromium	Metals	µg/m^3	< 0.034722	< 0.034722	< 0.034722	< 0.034722	< 0.034722	< 0.034722
Lead	Metals	µg/m^3	0.082639	0.077778	0.09375	< 0.069444	< 0.069444	< 0.069444
Manganese	Metals	µg/m^3	< 0.13889	< 0.13889	< 0.13889	< 0.13889	< 0.13889	< 0.13889
Nickel	Metals	µg/m^3	< 0.034722	< 0.034722	< 0.034722	< 0.034722	< 0.034722	< 0.034722
PM_{10}		µg/m^3	226	243	166	80	48	131
Vanadium	Metals	µg/m^3	< 0.13889	< 0.13889	< 0.13889	< 0.13889	< 0.13889	< 0.13889
Zinc	Metals	µg/m^3	< 0.34722	< 0.34722	< 0.34722	< 0.34722	< 0.34722	< 0.34722

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

APPENDIX I

ANALYTICAL SAMPLE RESULTS
AMBIENT AIR SAMPLES
TAJI, IRAQ
5 SEPTEMBER-9 NOVEMBER 2009

DOEHRS Sample ID			00001H6I	00001H6L	00001H6Y	00001H76	00001H7A	00001I7S
Field/Local Sample ID			IRQ_TAJI_PM10 MV_09268	IRQ_TAJI _09283_01A	IRQ_TAJI_09289 _PM10MV	IRQ_TAJI_PM10 MV_09303	IRQ_TAJI_ 09306_01A	IRQCPTAJI09305 PM10DPS
Site			Building 703	Building 703	Building 703	Building 703	Building 703	MDHU
Start Date			2009/09/25 1400	2009/10/10 1040	2009/10/16 1100	2009/10/30 1000	2009/11/01 1149	2009/11/01 1152
Parameter	Class	Units	Concentration[1,2]					
Antimony	Metals	µg/m^3	< 0.13103	< 0.13889	< 0.13889	< 0.13889	< 0.15432	< 0.069444
Arsenic	Metals	µg/m^3	< 0.065514	< 0.069444	< 0.069444	< 0.069444	< 0.077160	< 0.034722
Beryllium	Metals	µg/m^3	< 0.065514	< 0.069444	< 0.069444	< 0.069444	< 0.077160	< 0.034722
Cadmium	Metals	µg/m^3	< 0.065514	< 0.069444	< 0.069444	< 0.069444	< 0.077160	< 0.034722
Chromium	Metals	µg/m^3	< 0.065514	< 0.069444	< 0.069444	< 0.069444	< 0.077160	< 0.034722
Lead	Metals	µg/m^3	< 0.13103	< 0.13889	< 0.13889	0.85972	< 0.15432	2.2778
Manganese	Metals	µg/m^3	< 0.26205	< 0.27778	< 0.27778	< 0.27778	< 0.30864	< 0.13889
Nickel	Metals	µg/m^3	< 0.065514	< 0.069444	< 0.069444	< 0.069444	< 0.077160	< 0.034722
PM_{10}		µg/m^3	163	161	214	452	267	111
Vanadium	Metals	µg/m^3	< 0.26205	< 0.27778	< 0.27778	< 0.27778	< 0.30864	< 0.13889
Zinc	Metals	µg/m^3	< 0.65514	< 0.69444	< 0.69444	< 0.69444	< 0.77160	< 0.34722

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LEGEND:
DOEHRS Sample ID = Deployment Occupational and Environmental Health Readiness System Sample Identification Number
µg/m^3 = micrograms per cubic meter
MDHU = Modular Detainee Housing Unit

APPENDIX J

ANALYTICAL SAMPLE RESULTS
AMBIENT AIR SAMPLES
TAJI, IRAQ
5 SEPTEMBER-9 NOVEMBER 2009

DOEHRS Sample ID			00001I7V	00001IXU	00001IXW	00001IXY	00001IY3
Field/Local Sample ID			IRQCPTAJI09306 PM10DPS	IRQCATAJI09309 PM10-1	IRQCATAJI09309 PM10-2	IRQCATAJI09310 PM10-1	IRQCATAJI09310 PM10-2
Site			SHU	SHU	Spartan Gate	SHU	Burn Pit
Start Date			2009/11/02 1430	2009/11/05 1602	2009/11/05 1608	2009/11/06 1400	2009/11/06 1445
Parameter	Class	Units	Concentration[1,2]				
Antimony	Metals	µg/m^3	< 0.069444	< 0.069444	< 0.069444	< 0.069444	< 0.069444
Arsenic	Metals	µg/m^3	< 0.034722	< 0.034722	< 0.034722	< 0.034722	< 0.034722
Beryllium	Metals	µg/m^3	< 0.034722	< 0.034722	< 0.034722	< 0.034722	< 0.034722
Cadmium	Metals	µg/m^3	< 0.034722	< 0.034722	< 0.034722	< 0.034722	< 0.034722
Chromium	Metals	µg/m^3	0.052917	< 0.034722	< 0.034722	< 0.034722	< 0.034722
Lead	Metals	µg/m^3	< 0.069444	0.16528	0.076389	0.077778	< 0.069444
Manganese	Metals	µg/m^3	0.64167	< 0.13889	< 0.13889	< 0.13889	< 0.13889
Nickel	Metals	µg/m^3	0.063681	< 0.034722	< 0.034722	< 0.034722	< 0.034722
PM_{10}		µg/m^3	1700	1001	223	138	176
Vanadium	Metals	µg/m^3	< 0.13889	< 0.13889	< 0.13889	< 0.13889	< 0.13889
Zinc	Metals	µg/m^3	< 0.34722	< 0.34722	< 0.34722	< 0.34722	< 0.34722

[1]< X.XX = Below laboratory reporting limit (X.XX)
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LEGEND:
DOEHRS Sample ID = Deployment Occupational and Environmental Health Readiness System Sample Identification Number
µg/m^3 = micrograms per cubic meter
SHU = Soldier housing unit

APPENDIX K

ANALYTICAL SAMPLE RESULTS
AMBIENT AIR SAMPLES
TAJI, IRAQ
5 SEPTEMBER-9 NOVEMBER 2009

DOEHRS Sample ID			00001JLO	00001JLT	00001JM0	00001JM9	00001JMQ
Field/Local Sample ID			IRQCPTAJI 109311	IRQCPTAJI 109311	IRQCPTAJI 109312 PM10	IRQCPTAJI 109313PM10	IRQCPTAJI 109313PM10
Site			SHU	Spartan Gate	SHU	SHU	DFAC
Start Date			2009/11/07 1513	2009/11/07 1521	2009/11/08 1022	2009/11/09 1020	2009/11/09 1052
Parameter	Class	Units	Concentration[1,2]				
Antimony	Metals	µg/m^3	< 0.069444	< 0.069444	< 0.069444	< 0.069444	< 0.069444
Arsenic	Metals	µg/m^3	< 0.034722	< 0.034722	< 0.034722	< 0.034722	< 0.034722
Beryllium	Metals	µg/m^3	< 0.034722	< 0.034722	< 0.034722	< 0.034722	< 0.034722
Cadmium	Metals	µg/m^3	< 0.034722	< 0.034722	< 0.034722	< 0.034722	< 0.034722
Chromium	Metals	µg/m^3	< 0.034722	< 0.034722	< 0.034722	< 0.034722	< 0.034722
Lead	Metals	µg/m^3	< 0.069444	< 0.069444	0.096528	< 0.069444	< 0.069444
Manganese	Metals	µg/m^3	< 0.13889	< 0.13889	< 0.13889	< 0.13889	< 0.13889
Nickel	Metals	µg/m^3	< 0.034722	< 0.034722	< 0.034722	< 0.034722	< 0.034722
PM_{10}		µg/m^3	216	302	243	268	195
Vanadium	Metals	µg/m^3	< 0.13889	< 0.13889	< 0.13889	< 0.13889	< 0.13889
Zinc	Metals	µg/m^3	< 0.34722	< 0.34722	< 0.34722	< 0.34722	< 0.34722

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

µg/m^3 = micrograms per cubic meter
SHU = Soldier housing unit
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