DEPARTMENT OF THE ARMY
US ARMY INSTITUTE OF PUBLIC HEALTH
5158 BLACKHAWK ROAD
ABERDEEN PROVING GROUND MARYLAND 21010-5403

MCHB-IP-RDE

16 JUL 2012

MEMORANDUM FOR Office of the Command Surgeon (LTC (b) (6)), U.S. Central Command, 7115 South Boundary Boulevard, MacDill Air Force Base, FL 33621-5101

SUBJECT: Deployment Occupational and Environmental Health Surveillance Sample Report, Airborne Particulate Matter, Bagram, Afghanistan, 25 November 2011-26 April 2012, U_AFG_BAGRAM_IP_A10_20120426

1. The enclosed report details the assessment of particulate matter (PM) air samples collected by the 155th Medical Detachment personnel, Bagram, Afghanistan, 25 November 2011-26 April 2012.

2. The samples were collected for airborne PM less than 10 micrometers in diameter (PM_{10}) and analyzed for a set of metals typically found in PM. The PM_{10} was identified as an acute hazard during the assumed exposure timeframe. Based on the samples and associated exposure information assessed in the enclosed report, the tactical risk estimate for PM_{10} on both typical and peak exposure days during the sampled timeframe is **low**. No metals were identified as acute hazards.

FOR THE DIRECTOR:

(b) (6)

Encl

Portfolio Director, Health Risk Management

CF: (w/encl)
61st MED DET (Commander/CPT (b) (6))
ARCENT (Force Health Protection Officer/CPT (b) (6))
CSTC-A (Force Health Protection Officer/Maj (b) (6))
ARCENT (Force Health Protection Officer/MAJ (b) (6))
USAFSAM (Chief, Special Projects/Maj (b) (6))
USFOR-A (Force Health Protection Officer/MAJ (b) (6))

USAPHC
U.S. ARMY PUBLIC HEALTH COMMAND
5158 Blackhawk Road, Aberdeen Proving Ground, Maryland 21010-5403

Deployment Occupational and Environmental Health Surveillance Sample Report,
U_AFG_BAGRAM_IP_A10_20120426
Health Risk Management Portfolio

Airborne Particulate Matter, Bagram, Afghanistan

Prepared by (b) (6)
Deployment Environmental Surveillance Program

Preventive Medicine Surveys: 40-5f1

ACKNOWLEDGEMENTS

Deployment Occupational and Environmental Health Surveillance Sample Report Airborne Particulate Matter Bagram, Afghanistan 25 November 2011-26 April 2012 U_AFG_BAGRAM_IP_A10_20120426

1 References

See Appendix A for a list of references.

2 Purpose

This report provides the U.S. Army Public Health Command (USAPHC), Army Institute of Public Health (AIPH) assessment of the laboratory analytical results and exposure information associated with the samples were collected by 155th Medical Detachment and 61st Medical Detachment personnel on 25 November 2011-26 April 2012 at Bagram, Afghanistan according to the U.S. Department of Defense deployment occupational and environmental health (DOEH) surveillance requirements. The assessment serves several purposes. It identifies DOEH hazards that may be related to acute health effects that could occur in personnel during their deployment. It provides an official record of observed exposure conditions for use in future site evaluations. It identifies whether or not there is a potential for chronic health concerns which may require additional characterization. Finally, this report includes preventive steps to reduce or eliminate occupational and environmental exposures and surveillance and/or sampling recommendations, as necessary.

3 Scope

The assessment of sample results and exposure information in this report follows the process published in the USAPHC Provisional (Prov) Technical Guide (TG) 230 “Environmental Health Risk Assessment and Chemical Exposure Guidelines for Deployed Military Personnel, June 2010 Revision.” The assessment is based on limited data representing a specific time period and assesses short-term exposure risks only. Therefore, this report cannot be used alone to estimate the risk of chronic health effects from exposures. In addition, this assessment does not address all DOEH hazards to which U.S. personnel may be exposed.

4 Laboratory Analysis

Filters used to collect deployment air samples of particulate matter (PM) are shipped to the USAPHC, AIPH and weighed to determine particulate mass and calculate ambient concentrations. The USAPHC, AIPH laboratory also analyzes the PM for a standard set of metals typically found in PM. The complete analytical sample results can be viewed in the Defense Occupational and Environmental Health Readiness System (DOEHRS). Log into the DOEHRS and search for the samples using the DOEHRS sample identification numbers (IDs) provided in Appendix B.

5 Exposure Setting

Table 1 contains information about the sampling location, environmental conditions, and associated potential population exposure. The information was provided on the field data sheets and/or exposure assessment worksheets submitted with the samples unless otherwise noted. Correction and clarification of exposure assumptions by the sampling unit is encouraged.

Table 1. Exposure Information

Questions About Exposure	Information Provided and Assumptions
Why was this sample/sample set collected?	Assess exposure to PM less than 10 micrometers in diameter (PM_{10}) and metals in the ambient air at this location.
What population is exposed and how?	All basecamp personnel breathe the ambient air. However, it is assumed that personnel spend part of each day indoors.
What is the timeframe under consideration?	Although personnel will be deployed to this location for approximately 1 year, only the timeframe of five months between the first and last sample dates is being assessed.
Where was the sample/sample set collected?	The samples were collected from the new burn pit, landfill guard tower, four corners, and Warrior base camp.
What is known about location, activity, setting and potential sources of contamination that may affect exposure?	The new burn site is currently non-operational and is not located near any industry. Soldiers on guard duty are exposed to smoke from the burn pit at the landfill. Service members and civilian personnel arriving and departing Bargram Airfield terminal are exposed to this busy intersection located at the four corners.

6 Prescreen

Table 2 shows whether parameters are identified as potential hazards because their concentrations are greater than their most health-protective screening level USAPHC (Prov) TG 230 military exposure guidelines (MEGs). Potential hazards are further assessed to determine if they are acute hazards. Parameters analyzed but not shown in Table 2 are not considered hazards. The prescreening is conducted as described in USAPHC (Prov) TG 230, section 3.4.3. The sample results were compared to MEGs on 22 May 2012.

Table 2. Results of Prescreen

Parameter	Peak Concentration (µg/m^3)	1-year Negligible MEG (µg/m^3)	Result
PM_{10}	295	Not defined	Retain as potential hazard

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

7 Acute Screen

Table 3 shows whether parameters identified as potential hazards after prescreening are considered acute hazards because their concentrations are greater than their acute screening MEGs. Acute hazards are further assessed to estimate the tactical risk from exposure to these parameters in the ambient air. The acute screening is conducted as described in USAPHC (Prov) TG 230, section 3.4.5.1.

Table 3. Results of Acute Screen

Parameter	Peak Concentration (µg/m^3)	Screening MEG (µg/m^3)	Result
PM_{10}	295	24 hour Negligible MEG: 250	Retain as potential hazard

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

7.2 Hazard Severity

Table 4 summarizes the hazard severity levels determined by comparing the peak and average sample day concentrations of the acute hazards to the appropriate MEGs. The peak concentration is intended to represent the worst exposure conditions and the average concentration is intended to represent typical exposure conditions. Hazard severity is determined using USAPHC (Prov) TG 230, section 3.4.5.2.

Table 4. Hazard Severity

Parameter	Concentration (µg/m^3)	Comparison MEGs (µg/m^3)	Hazard Severity
PM_{10}	Peak: 295	Is > 24-hour Negligible MEG: 250 but < 24-hour Marginal MEG: 420	Negligible
	Average: 175	Is ≤ 24-hour Negligible MEG: 250	Negligible

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

7.3 Hazard Probability

Table 5 summarizes the hazard probability determinations for each acute hazard. Refer to USAPHC (Prov) TG 230, section 3.4.5.3 for additional information about hazard probability scoring methodology.

Table 5. Hazard Probability Scoring for PM_{10}

Concentration ($\mu g/m^3$)	Hazard Probability Scoring for Exposure Factors				Hazard Probability
	Degree of Exposure	Represent-ativeness of Sample Data	Duration of Exposure	Rate of Exposure	
Peak: 295	Score 2: Concentration is at or between the 25th and 75th percentiles of the severity range.	Score 2: Field data adequately estimate population exposure during this time frame.	Score 1: Field exposure duration to MEG exposure duration ratio is <1 (Personnel will not be exposed to the ambient air at this site for 24 continuous hours).	Score 2: Typical exertion (no information to indicate otherwise).	Total Score 7: Seldom
Average: 175	Score 1: Concentration is <25th percentile of severity range.	Score 2: Field data adequately estimate population exposure during this timeframe.	Score 1: Field exposure duration to MEG exposure duration ratio is <1 (Personnel will not be exposed to the ambient air at this site for 24 continuous hours).	Score 2: Typical exertion (no information to indicate otherwise).	Total Score 6: Unlikely

7.4 Tactical Risk Estimate

Table 6 summarizes the acute risk assessment for exposure to each of the acute hazards. The tactical risk estimate was determined using the USAPHC (Prov) TG 230, Table 3-1 “Military Risk Assessment Matrix.” The tactical risk estimates are color-coded consistent with the black, red, amber, green system described in Department of the Army Field Manual 1-02 "Operational Terms and Graphics."

Table 6. Risk Assessment Summary

Parameter	Type of Exposure	Hazard Severity	Hazard Probability	Tactical Risk Estimate
PM_{10}	Peak	Negligible	Seldom	Low
	Average	Negligible	Unlikely	
Metals	None identified as acute hazards.			

8 Conclusion

Based on the sample results and associated exposure information assessed in this report, the tactical risk estimate for PM_{10} on both typical and peak exposure days during the sampled timeframe is **low**. No metals were identified as acute hazards. Refer to USAPHC (Prov) TG 230, Table 3-2 for the potential consequences to military operations and force readiness associated with this risk level.

9 Conclusion

Neither PM_{10} nor any of the analyzed metals were identified as acute hazards because their concentrations were not greater than their acute screening level MEGs.

10 Limitations

10.1 Field Data Quality

Field data provided with the sample were adequate.

Out of 36 samples collected, 23 samples were invalid due to timer malfunction and flow differential. Freezing to sub-freezing temperatures were believed to be the cause of the invalid samples.

10.2 Sample Receipt at USAPHC Laboratory

The sample was packaged correctly.

10.3 Laboratory Data Quality

No laboratory data quality issues with this sample were identified.

Some parameters in this data set are flagged with a J code (^{J}). This code indicates an estimated value that was detected above the Method Detection Limit but below the Method Reporting Limit (also known as Limit of Quantitation or Practical Quantitation Limit).

11 Recommendations and Notes

Maintain communication with USAPHC, AIPH points of contact (POCs) and continue standard surveillance of airborne PM and metals in accordance with defined Occupational and Environmental Health Site Assessment (OEHSA) Exposure Pathways and sampling plans for your location.

If an OEHSA and/or specific sampling plans have not yet been completed for Bagram, Afghanistan, collect ambient PM air samples from sites that best represent exposures at least once every 6 days to better characterize conditions over time.

12 Points of Contact

The USAPHC, AIPH POCs for this assessment are Mr. (b) (6) and Ms. (b) (6). Mr. (b) (6) may be contacted at e-mail (b) (6) and 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)

LTC, MS
Program Manager
Deployment Environmental Surveillance

Appendix A

References

Department of Defense. 2004. Department of Defense Directive 6490.02E, *Comprehensive Health Surveillance*. http://www.dtic.mil/whs/directives/corres/pdf/649002Ep.pdf

Department of Defense. 2006. Department of Defense Instruction 6490.03, *Deployment Health*. http://www.dtic.mil/whs/directives/corres/pdf/649003p.pdf

Department of the Army. 2006. Field Manual 5-19, *Composite Risk Management*. https://rdl.train.army.mil/soldierPortal/atia/adlsc/view/public/23137-1/FM/5-19/TOC.HTM

U.S. Army Public Health Command (Provisional). 2010. Technical Guide 230, *Chemical Exposure Guidelines for Deployed Military Personnel*. http://phc.amedd.army.mil/PHC%20Resource%20Library/TG230.pdf

Appendix B

Sample Identification Information

DOEHRS Sample ID	Sample ID Reported on Field Data Sheet	Sample Site	Date and Time Sample Collected	Sampling Duration	Sample Invalid (Yes/No) Reason for Invalid Sample
000067K2	AFG_BAGRAM_11329_PM10DPS	Landfill Guard Tower	2011/11/25 1000	844.0 minutes	Yes, Timer Malfunction
000067VJ	AFG_BAGRAM_11329_PM10DPS	New Burn Pit	2011/11/25 1000	1091.0 minutes	Yes, Timer Malfunction
000067W7	AFG_BAGRAM_11330_PM10DPS	New Burn Pit	2011/11/26 1015	1089.0 minutes	Yes, Timer Malfunction
000067WS	AFG_BAGRAM_11330_PM10DPS	Landfill Guard Tower	2011/11/26 1204	575.0 minutes	Yes, Timer Malfunction
000067XD	AFG_BAGRAM_11331_PM10DPS	New Burn Pit	2011/11/27 1025	1091.0 minutes	Yes, Timer Malfunction
000067YI	AFG_BAGRAM_11331_PM10DPS	Landfill Guard Tower	2011/11/27 1130	627.0 minutes	Yes, Timer Malfunction
000067YU	AFG_BAGRAM_11332_PM10DPS	Landfill Guard Tower	2011/11/28 1012	1445.0 minutes	No
000067YO	AFG_BAGRAM_11332_PM10DPS	New Burn Pit	2011/11/28 1035	1100.0 minutes	Yes, Timer Malfunction
0000682O	AFG_BAGRAM_11333_PM10DPS	Landfill Guard Tower	2011/11/29 1029	1070.0 minutes	Yes, Timer Malfunction
0000683M	AFG_BAGRAM_11334_PM10DPS	Landfill Guard Tower	2011/11/30 1016	798.0 minutes	Yes, Timer Malfunction
0000683Z	AFG_BAGRAM_11334_PM10DPS	New Burn Pit	2011/11/30 1135	944.0 minutes	Yes, Timer Malfunction
000067FP	AFG_BAGRAM_11335_PM10DPS	Landfill Guard Tower	2011/12/01 1006	1428.0 minutes	No
000067EM	AFG_BAGRAM_11335_PM10DPS	New Burn Pit	2011/12/01 1029	1404.0 minutes	Yes, Flow Differential
000067G5	AFG_BAGRAM_11336_PM10DPS	Landfill Guard Tower	2011/12/02 1007	1154.0 minutes	No
000067G9	AFG_BAGRAM_11336_PM10DPS	New Burn Pit	2011/12/02 1025	1442.0 minutes	Yes, Flow Differential
000067G2	AFG_BAGRAM_11337_PM10DPS	Landfill Guard Tower	2011/12/03 1011	1109.0 minutes	Yes; timer malfunction
000067GB	AFG_BAGRAM_11337_PM10DPS	New Burn Pit	2011/12/03 1028	1442.0 minutes	Yes, Flow Differential
000067I9	AFG_BAGRAM_11338_PM10DPS	Landfill Guard Tower	2011/12/04 1012	995.0 minutes	Yes, Flow Differential

DOEH Surveillance Sample Report, Airborne PM, Bagram, Afghanistan, 25 Nov 11-26 Apr 12, U_AFG_BAGRAM_IP_A10_20120426

DOEHRS Sample ID	Sample ID Reported on Field Data Sheet	Sample Site	Date and Time Sample Collected	Sampling Duration	Sample Invalid (Yes/No) Reason for Invalid Sample
000067H0	AFG_BAGRAM_11338_PM10DPS	New Burn Pit	2011/12/04 1031	1203.0 minutes	Yes, Timer Malfunction
000067JG	AFG_BAGRAM_11339_PM10DPS	Landfill Guard Tower	2011/12/05 1000	1442.0 minutes	No
000067IA	AFG_BAGRAM_11339_PM10DPS	New Burn Pit	2011/12/05 1010	1441.0 minutes	Yes, Flow Differential
000067K0	AFG_BAGRAM_11340_PM10DPS	Landfill Guard Tower	2011/12/06 1003	1455.0 minutes	No
000067JJ	AFG_BAGRAM_11340_PM10DPS	New Burn Pit	2011/12/06 1015	1464.0 minutes	Yes, Flow Differential
00006868	AFG_BAGRAM_11341_PM10DPS	New Burn Pit	2011/12/07 1015	1582.0 minutes	Yes, Timer Malfunction
00006858	AFG_BAGRAM_11341_PM10DPS	Landfill Guard Tower	2011/12/07 1027	1128.0 minutes	Yes, Timer Malfunction
00006UBI	AFG_BAGRAM_12069_PM10DPS	Landfill Guard Tower	2012/03/09 1500	1440.0 minutes	No
00006UC2	AFG_BAGRAM_12069_PM10DPS	Warrior Base Camp	2012/03/09 1500	1440.0 minutes	No
00006VF3	AFG_BAGRAM_12069_PM10DPS	New Burn Pit	2012/03/09 1500	1440.0 minutes	No
00006UJM	AFG_BAGRAM_12100_PM10DPS	Landfill Guard Tower	2012/04/09 1025	1632.0 minutes	Yes; timer malfunction
00006UIM	AFG_BAGRAM_12111_PM10DPS	Four Corners	2012/04/09 1140	642.0 minutes	Yes, Sample Malfunction
00006UJB	AFG_BAGRAM_12100_PM10DPS	Warrior Base Camp	2012/04/09 1210	1440.0 minutes	No
00006ULY	AFG_BAGRAM_12111_PM10DPS	Landfill Guard Tower	2012/04/20 0950	1256.0 minutes	Yes; timer malfunction
00006UM8	AFG_BAGRAM_12111_PM10DPS	Four Corners	2012/04/20 1015	1440.0 minutes	No
00006UN3	AFG_BAGRAM_12118_PM10DPS	Landfill Guard Tower	2012/04/26 1015	532.0 minutes	Yes, Battery Failure
00006UNH	AFG_BAGRAM_12118_PM10DPS	Four Corners	2012/04/26 1035	987.0 minutes	Yes, Battery Failure