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MCHB-IP-RDE

05 NOV 2011

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, Kandahar, Afghanistan, 7 July-24 August 2011, U_AFG_KANDAHAR_IP_A10_20110824

1. The enclosed report details the assessment of particulate matter (PM) air samples collected by 5th Preventive Medicine Detachment personnel, Kandahar, Afghanistan, 7 July-24 August 2011.

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} at the burn pit, morale welfare, south park and morale, welfare and recreation (MWR), and board walk on a typical exposure day in the sampled timeframe is **low** and on a peak exposure day it is **moderate.**

FOR THE DIRECTOR:

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Portfolio Director, Health Risk Management

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USAPHC
U.S. ARMY PUBLIC HEALTH COMMAND
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Deployment Occupational and Environmental Health Surveillance Sample Report, U_AFG_KANDAHAR_IP_A10_20110824
Health Risk Management Portfolio

Airborne Particulate Matter, Kandahar, Afghanistan

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Deployment Environmental Surveillance Program

Preventive Medicine Surveys: 40-5f1

ACKNOWLEDGEMENTS

DEPLOYMENT OCCUPATIONAL AND ENVIRONMENTAL HEALTH SURVEILLANCE SAMPLE REPORT AIRBORNE PARTICULATE MATTER KANDAHAR, AFGHANISTAN 7 JULY-24 AUGUST 2011 U_AFG_KANDAHAR_IP_A10_20110824

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 collected by 5th Preventive Medicine Detachment on 7 July-24 August 2011 at Kandahar, 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-Environmental Health (DOEHRS-EH). Log into the DOEHRS-EH and search for the samples using the DOEHRS sample identification numbers (IDs) provided in Table 1.

5 Exposure Setting

Information about the individual samples including sample date and site, is provided in Appendix B. Table 2 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 2. Exposure Information

Questions About Exposure	Information Provided and Assumptions
Why was this sample/sample set collected?	Routine sampling of PM less than 10 micrometers in diameter (PM_{10}) and metals in the ambient air.
What population is exposed and how?	The majority of basecamp personnel are exposed to 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 approximately 2 months between the first and last sample dates is being assessed.
Where was the sample/sample set collected?	The samples were collected from the burn pit, south park, boardwalk and moral welfare and recreation (MWR).
What is known about location, activity, setting and potential sources of contamination that may affect exposure?	There is no active industry nearby but there are six incinerators and one burn pit on this camp.

6 Prescreen

Table 3 shows whether parameters are identified as potential hazards because their peak single sample 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 3 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 13 October 2011.

Table 3. Results of Prescreen

Parameter	Detections/Samples	Peak Single Sample Concentration (µg/m^3)	1-year Negligible MEG (µg/m^3)	Result
PM_{10}	18/18	667	Not defined	Retain as potential hazard
Antimony	1/18	0.038156	171	Exclude as potential hazard
Manganese	16/18	0.33275	3.42	Exclude as potential hazard

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

7 Acute Risk Assessment

7.1 Acute Screen

Table 4 shows whether parameters identified as potential hazards after prescreening are considered acute hazards because their peak sample day 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 4. Results of Acute Screen

Parameter	Peak Sample Day Concentration (µg/m^3)	Screening MEG (µg/m^3)	Result
PM_{10}	667	24 hour Negligible MEG: 250	Retain as acute hazard

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

7.2 Hazard Severity

Table 5 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 5. Hazard Severity

Parameter	Concentration ($\mu g/m^3$)	Comparison MEGs ($\mu g/m^3$)	Hazard Severity
PM_{10}	Peak: 667	Is ≥ 24-hour Critical MEG: 600	Critical
	Average: 477	Is ≥ 24-hour Marginal MEG: 450, but < 24-hour Critical MEG: 600	Marginal

Legend: $\mu g/m^3$ = micrograms per cubic meter

7.3 Hazard Probability

Table 6 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 6. 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: 667	Score 2: Concentration is greater than the Critical MEG and the next higher MEG does not exist.	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 7: Seldom
Average: 477	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 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 7: Seldom

Legend: $\mu g/m^3$ = micrograms per cubic meter

7.4 Tactical Risk Estimate

Table 7 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 7. Risk Assessment Summary

Parameter	Type of Exposure	Hazard Severity	Hazard Probability	Tactical Risk Estimate
PM_{10}	Peak	Critical	Seldom	Moderate
	Average	Marginal	Seldom	Low
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 a typical exposure day in the sampled timeframe is **low** and on a peak exposure day it is **moderate**. 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 these risk levels.

9 Limitations

9.1 Field Data Quality

Field data provided with the samples were adequate.

Two of the samples were invalid. One was invalid due to a flow differential and the other, a sample equipment malfunction

9.2 Sample Receipt at USAPHC Laboratory

The sample set was packaged correctly.

9.3 Laboratory Data Quality

No laboratory data quality issues associated with this sample set 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).

9.4 Risk Assessment

Parameter concentrations on days with multiple samples were averaged together to determine a single concentration for the day.

If a parameter was not detected in all samples, half of the laboratory reporting limit was used to calculate an average.

10 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 Kandahar, Afghanistan, collect ambient PM air samples from sites that best represent exposures at least once every 6 days to better characterize conditions over time.

11 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).

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Appendix A

References

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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

Department of the Army. 2004. Field Manual 1-02, *Operational Terms and Graphics*. https://rdl.train.army.mil/soldierPortal/atia/adlsc/view/public/11444-1/FM/1-02/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	Field/Local Sample ID	Sample Site	Date and Time Sample Collected	Sampling Duration	Sample Invalid (Yes/No) Reason for Invalid Sample
00005A3P	AFG KANDAH 10193 PM10DPS	Board Walk	2011/07/07 0834	1440.0 min	No
000059N5	AFG KANDAH 10193 PM10DPS	MWR	2011/07/07 0843	1440.0 min	No
000059N2	AFG KANDAH 10193 PM10DPS	South Park	2011/07/07 0858	1440.0 min	No
000059O0	AFG KANDAH 10193 PM10DPS	Burn Pit	2011/07/07 0907	1440.0 min	No
00005A0Q	AFG KANDAH 10193 PM10DPS	Board Walk	2011/07/19 0847	1440.0 min	No
00005A1F	AFG KANDAH 10193 PM10DPS	MWR	2011/07/19 0900	1440.0 min	No
00005A26	AFG KANDAH 10193 PM10DPS	South Park	2011/07/19 0914	1440.0 min	No
000059YX	AFG KANDAH 10193 PM10DPS	Burn Pit	2011/07/19 0923	1440.0 min	No
00005DPZ	AFG_KANDAH_10193_ PM10DPS	Board Walk	2011/08/01 0841	1440.0 min	No
00005DON	AFG_KANDAH_10193_ PM10DPS	MWR	2011/08/01 0853	1440.0 min	No
00005DNU	AFG_KANDAH_10193_ PM10DPS	South Park	2011/08/01 0902	1440.0 min	No

DOEH Surveillance Sample Report, Airborne PM, Kandahar, Afghanistan, 7Jul-24 Aug 11, U_AFG_KANDAHAR_IP_A10_20110824

DOEHRS Sample ID	Field/Local Sample ID	Sample Site	Date and Time Sample Collected	Sampling Duration	Sample Invalid (Yes/No) Reason for Invalid Sample
00005DMF	AFG_KANDAH_10193_PM10DPS	Burn Pit	2011/08/01 0913	1440.0 min	No
00005DPB	AFG_KANDAH_10193_PM10DPS	MWR	2011/08/11 0911	1440.0 min	No
00005DQ4	AFG_KANDAH_10193_PM10DPS	Board Walk	2011/08/12 0901	1440.0 min	No
00005DO2	AFG_KANDAH_10193_PM10DPS	South Park	2011/08/12 0920	1440.0 min	No
00005DMQ	AFG_KANDAH_10193_PM10DPS	Burn Pit	2011/08/12 0931	1440.0 min	Yes-Sample Malfunction
00005DOD	AFG_KANDAH_10193_PM10DPS	South Park	2011/08/24 0833	1440.0 min	No
00005DPT	AFG_KANDAH_10193_PM10DPS	MWR	2011/08/24 0843	1440.0 min	No
00005DQ6	AFG_KANDAH_10193_PM10DPS	Board Walk	2011/08/24 0858	1440.0 min	No
00005DMV	AFG_KANDAH_10193_PM10DPS	Burn Pit	2011/08/24 0908	1440.0 min	Yes-Flow Differential