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MCHB-IP-RDE

25 JUL 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, Leatherneck, Afghanistan, 14-18 March 2011, U_AFG_LEATHERNECK_IP_A25_201100318

1. The enclosed report details the assessment of particulate matter (PM) air samples collected by Marine Expeditionary Force-Headquarters Group personnel, Leatherneck, Afghanistan, 14-18 March 2011.

2. The samples were collected for airborne PM less than 2.5 micrometers in diameter ($PM_{2.5}$) and analyzed for a set of metals typically found in PM. The $PM_{2.5}$ 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 $PM_{2.5}$ at the motor lot and burn pit 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)

Portfolio Director, Health Risk Management

Encl

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Deployment Occupational and Environmental Health Surveillance Sample Report,
U_AFG_LEATHERNECK_IP_A25_201100318
Health Risk Management Portfolio

Airborne Particulate Matter, Leatherneck, Afghanistan

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Preventive Medicine Surveys: 40-5f1

ACKNOWLEDGMENTS

DEPLOYMENT OCCUPATIONAL AND ENVIRONMENTAL HEALTH SURVEILLANCE SAMPLE REPORT AIRBORNE PARTICULATE MATTER LEATHERNECK, AFGHANISTAN 14-18 MARCH 2011 U_AFG_LEATHERNECK_IP_A25_201100318

1 References

See Appendix A for a list of references.

2 Purpose

This report provides the U.S. Army Public Health Command (Provisional) (USAPHC (Prov)), Army Institute of Public Health (AIPH) assessment of the laboratory analytical results and exposure information associated with the samples collected by Marine Expeditionary Force-Headquarters Group (MHG) on 14-18 March 2011 at Leatherneck, 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 (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 (Prov), AIPH, and weighed to determine particulate mass and calculate ambient concentrations. The USAPHC (Prov), 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.

Table 1. Sample Identification Information

DOEHRS-EH Sample ID	Sample ID Reported on Field Data Sheet	Sample Site	Date and Time Sample Collected	Sample Invalid (Yes/No) Reason for Invalid Sample
00004GIN	AFG_LEATHE_11073_PM25DPS	Burn Pit	2011/03/14 1326	No
00004GIA	AFG_LEATHE_11073_PM25DPS	MHG Motor Lot	2011/03/14 1449	No
00004GID	AFG_LEATHE_11076_PM25DPS	MHG Motor Lot	2011/03/17 1533	No
00004GJ7	AFG_LEATHE_11076_PM25DPS	Burn Pit	2011/03/17 1700	No
00004GJ8	AFG_LEATHE_11077_PM25DPS	Burn Pit	2011/03/18 1746	No
00004GIE	AFG_LEATHE_11077_PM25DPS	MHG Motor Lot	2011/03/18 1750	No

5 Exposure Setting

Table 2 contains information about the sampling location, environmental conditions, and associated potential population exposure. The information was provided on the field data sheets submitted with the sample set unless otherwise noted. Information about the individual samples including sample date and site, is provided in Table 1. Correction and clarification of exposure assumptions by the sampling unit is encouraged.

Table 2. Exposure Information

Questions About Exposure	Information Provided and Assumptions
What is the exposure event or ambient environmental condition under consideration?	Exposure to PM less than 2.5 micrometers in diameter ($PM_{2.5}$) and metals in the ambient air at this location.
What is the population at risk?	Entire base camp population.
What is the timeframe under consideration?	The samples were collected on 14-18 March 2011. This encompasses a timeframe of approximately 4 days from the first day of sampling to the last. Although personnel will be deployed to this location for approximately 1 year, only this timeframe of 4 days is being considered.
What are the activity patterns of the exposed population?	Typical exertion across the base camp. It is assumed personnel spend part of each day indoors.
What is known about sources of potential contamination?	No industry is located around the sampling areas. Generators are located near the motor lot. There is a smoke pit/"burn pit" at this camp.
What is known about the exposure setting?	Leatherneck is in Afghanistan
What are the exposure pathways?	Inhalation.
Where are the sampling sites relative to where exposure occurs?	The samples were collected near the generators at the motor lot and near the smoke pit/"burn pit" by the range.

Note: Questions are extracted from USAPHC (Prov) TG 230

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 10 May 2011.

Table 3. Results of Prescreen

Parameter	Detections/Samples	Peak Single Sample Concentration ($\mu g/m^3$)	1-year Negligible MEG ($\mu g/m^3$)	Result
$PM_{2.5}$	6/6	72	15	Retain as potential hazard

Legend: $\mu g/m^3$ = 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
$PM_{2.5}$	72	24 hour Negligible MEG: 65	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 (µg/m^3)	Comparison MEGs (µg/m^3)	Hazard Severity
$PM_{2.5}$	Peak: 72	Is > 24-hour Negligible MEG: 65 but < 24-hour Marginal MEG: 250	Negligible
	Average: 44	Is ≤ 24-hour Negligible MEG: 65	Negligible

Legend: µg/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 $PM_{2.5}$

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: 72	Score 1: Concentration is <25th percentile of severity range.	Score 2: Field data adequately estimate population exposure (for this timeframe).	Score 1: Field exposure duration to MEG exposure duration ratio is <1 (<24-hour exposure compared to 24-hour MEG).	Score 2: Typical exertion (no information to indicate otherwise).	Total Score 6: Unlikely
Average: 44	Score 1: Concentration is <25th percentile of severity range.	Score 2: Field data adequately estimate population exposure (for this timeframe).	Score 1: Field exposure duration to MEG exposure duration ratio is <1 (<24-hour exposure compared to 24-hour MEG).	Score 2: Typical exertion (no information to indicate otherwise).	Total Score 6: Unlikely

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 Field Manual 1-02 "Operational Terms and Graphics."

Table 7. Risk Assessment Summary

Parameter	Type of Exposure	Hazard Severity	Hazard Probability	Tactical Risk Estimate
$PM_{2.5}$	Peak	Negligible	Unlikely	Low
	Average	Negligible	Unlikely	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 $PM_{2.5}$ on both typical and peak exposure days during the sampled timeframe is **low**. Refer to USAPHC (Prov) TG 230, Table 3-2 for the potential consequences to

military operations and force readiness associated with this risk levels. No metals were identified as acute hazards.

9 Limitations

9.1 Field Data Quality

The field data sheets provided with the sample set were adequately filled out.

None of the samples were invalid.

9.2 Sample Receipt at USAPHC (Prov) 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 (Prov), 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 Leatherneck, 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 (Prov), AIPH POCs for this assessment are Ms. (b) (6) (b) (6) and Ms. (b) (6). Ms (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

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. Department of the Army (DA) Field Manual (FM) 5-19, Composite Risk Management, 21 August 2006.

4. DA FM 1-02, Operational Terms and Graphics, 21 September 2004.

5. USAPHC (Prov) Technical Guide (TG) 230, Chemical Exposure Guidelines for Deployed Military Personnel, June 2010.