DEPARTMENT OF THE ARMY
US ARMY INSTITUTE OF PUBLIC HEALTH
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MCHB-IP-RDE

17 OCT 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, Howz-e-Madad, Afghanistan, 6-8 July 2011, U_AFG_HOWZEMADAD_IP_A10_20110708

1. The enclosed report details the assessment of particulate matter (PM) air samples collected by 710th Brigade Support Battalion, 3rd Brigade Combat Team, 10th Mountain Division personnel, Howz-e-Madad, Afghanistan, 6-8 July 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} on both typical and peak exposure days during the sampled timeframe is **low**. No metals were identified as acute hazards.

FOR THE DIRECTOR:

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U.S. ARMY PUBLIC HEALTH COMMAND
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Deployment Occupational and Environmental Health Surveillance Sample Report, U_AFG_HOWZEMADAD_IP_A10_20110708
Health Risk Management Portfolio

Airborne Particulate Matter, Howz-e-Madad, Afghanistan

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Preventive Medicine Surveys: 40-5f1

ACKNOWLEDGEMENTS

DEPLOYMENT OCCUPATIONAL AND ENVIRONMENTAL HEALTH SURVEILLANCE SAMPLE REPORT AIRBORNE PARTICULATE MATTER HOWZ-E-MADAD, AFGHANISTAN 6-8 JULY 2011 U_AFG_HOWZEMADAD_IP_A10_20110708

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 710th Brigade Support Battalion, 3rd Brigade Combat Team, 10th Mountain Division on 6-8 July 2011 at Howz-e-Madad, 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.

Table 1. Sample Identification Information

DOEHRS-EH 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
00004Z1L	AFG_HOWZEM_ 11189_PM10DPS	Burn Pit – Fence Line	2011/07/06 1307	1440.0 minutes	No
00004Z1P	AFG_HOWZEM_ 11191_PM10DPS	Burn Pit	2011/07/08 1018	1440.0 minutes	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 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?	Ambient air sampling to assess air quality around the burn pit.
What population is exposed and how?	The majority of base camp 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 3 days between the first and last sample dates is being assessed.
Where was the sample/sample set collected?	The samples were collected in a close vicinity to the burn pit and the life support area. Active burning was reported on 6 July 2011.
What is known about location, activity, setting and potential sources of contamination that may affect exposure?	Active burn pit and generators were located near the sampling area. It was reported that the burn pit is poorly run.

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 6 September 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}	2/2	1,304	None	Retain as potential hazard
Antimony	2/2	0.90278	171	Exclude as potential hazard
Manganese	2/2	0.52083	3.42	Exclude as potential hazard
Nickel	2/1	0.069444	24.5	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}	1,304	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: 1,304	Is ≥ 24-hour Critical MEG: 600	Critical
	Average: 820	Is ≥ 24-hour Critical MEG: 600	Critical

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

7.3 Hazard Probability

Table 6 summarizes the hazard probability determinations for the 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: 1,304	Score 2: Concentration is >Critical MEG and next higher severity MEG does not exist.	Score 1: Field data overestimate population exposure (Only 2 days of sampling and 1 day of active burning).	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
Average: 820	Score 2: Concentration is >Critical MEG and next higher severity MEG does not exist.	Score 1: Field data overestimate population exposure (Only 2 days of sampling and 1 day of active burning).	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

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	Unlikely	Low
	Average	Critical	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_{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 Limitations

9.1 Field Data Quality

Field data provided with the samples were adequate.

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

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 Howz-e-Madad, 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 Ms. (b) (6) and Mr. (b) (6). Ms. (b) (6) may be contacted at e-mail (b) (6) and Mr. (b) 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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