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18 SEP 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, Phoenix, Afghanistan, 2 April-3 June 2012, U_AFG_PHOENIX_IP_A25_20120603

1. The enclosed report details the assessment of 26 particulate matter (PM) air samples collected by 1437th Medical Detachment personnel, Phoenix, Afghanistan, 2 April-3 June 2012. Three of the samples submitted were invalid.

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 $PM_{2.5}$ 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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Deployment Occupational and Environmental Health Surveillance Sample Report, U_AFG_PHOENIX_IP_A25_20120603 Health Risk Management Portfolio

Airborne Particulate Matter, Phoenix, Afghanistan

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ACKNOWLEDGEMENTS

Deployment Occupational and Environmental Health Surveillance Sample Report Airborne Particulate Matter Phoenix, Afghanistan 2 April-3 June 2012 U_AFG_PHOENIX_IP_A25_20120603

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 1437th Medical Detachment on 2 April-3 June 2012 at Phoenix, 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 Table 1.

Table 1. 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
0000768L	AFH_PHOENI_12093_PM 2.5DPS	A Trans	2012/04/02 1511	1440.0 minutes	No
0000766Q	AFH_PHOENI_12093_PM 2.5DPS	Tower 14	2012/04/02 1515	1440.0 minutes	No
00007680	AFH_PHOENI_12101_PM 2.5DPS	Burn Barrels	2012/04/10 1400	1440.0 minutes	No
0000768W	AFH_PHOENI_12101_PM 2.5DPS	A Trans	2012/04/10 1530	1440.0 minutes	No
0000765R	AFH_PHOENI_12101_PM 2.5DPS	Tower 14	2012/04/10 1430	1440.0 minutes	No
0000769X	AFH_PHOENI_12107_PM 2.5DPS	Burn Barrels	2012/04/16 1101	1440.0 minutes	No
00007676	AFH_PHOENI_12107_PM 2.5DPS	A Trans	2012/04/16 1430	1440.0 minutes	No
0000767D	AFH_PHOENI_12107_PM 2.5DPS	Tower 14	2012/04/16 1445	1440.0 minutes	No
000076A6	AFH_PHOENI_12149_PM 2.5DPS	A Trans	2012/04/28 1552	1440.0 minutes	No
00007686	AFH_PHOENI_12120_PM 2.5DPS	Tower 14	2012/04/29 0900	1440.0 minutes	No
00007683	AFH_PHOENI_12120_PM 2.5DPS	Burn Barrels	2012/04/29 1230	1440.0 minutes	No
00007689	AFH_PHOENI_12125_PM 2.5DPS	Burn Barrels	2012/05/04 1150	1440.0 minutes	No
00007691	AFH_PHOENI_12125_PM 2.5DPS	A Trans	2012/05/04 1200	1440.0 minutes	Yes, Battery Failure
0000769H	AFH_PHOENI_12124_PM 2.5DPS	Tower 14	2012/05/04 1400	1440.0 minutes	No
0000766G	AFH_PHOENI_12134_PM 2.5DPS	Tower 14	2012/05/13 1330	1440.0 minutes	No
000076A7	AFH_PHOENI_12134_PM 2.5DPS	A Trans	2012/05/13 1330	1440.0 minutes	Yes, Battery Failure
0000767V	AFG_PHOENI_12134_PM 2.5DPS	Tower 14	2012/05/13 1345	1440.0 minutes	No
000076AL	AFH_PHOENI_12140_PM 2.5DPS	Burn Barrels	2012/05/19 1305	1440.0 minutes	No
000076AT	AFH_PHOENI_12140_PM 2.5DPS	Tower 14	2012/05/19 1400	1440.0 minutes	No

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
000076AD	AFH_PHOENI_12141_PM 2.5DPS	A Trans	2012/05/20 1230	1440.0 minutes	No
0000766N	AFH_PHOENI_12148_PM 2.5DPS	Burn Barrels	2012/05/28 1400	1440.0 minutes	Yes, Missing Field Data
000076AG	AFH_PHOENI_12149_PM 2.5DPS	A Trans	2012/05/28 1400	1440.0 minutes	No
000076A9	AFH_PHOENI_12149_PM 2.5DPS	A Trans	2012/05/28 1552	1440.0 minutes	No
000076AC	AFH_PHOENI_12155_PM 2.5DPS	Burn Barrels	2012/06/03 1335	1440.0 minutes	No
000076AE	AFH_PHOENI_12155_PM 2.5DPS	Tower 14	2012/06/03 1345	1440.0 minutes	No
0000767L	AFH_PHOENI_12155_PM 2.5DPS	A Trans	2012/06/03 1350	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?	Assess exposure to PM less than 2.5 micrometers in diameter ($PM_{2.5}$) 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 two months between the first and last sample dates is being assessed.
Where was the sample/sample set collected?	The samples were collected from Tower 14, the A Transportation motor pool, and burn barrels.
What is known about location, activity, setting and potential sources of contamination that may affect exposure?	Industry is located around the sampling locations. Some of the industry is active.

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 23 July 2012.

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
$PM_{2.5}$	23/23	76	15	Retain as potential hazard
Lead	6/23	0.27233	12.231	Exclude as potential hazard
Zinc	6/23	1.9744	489.24	Exclude 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 ($\mu g/m^3$)	Screening MEG ($\mu g/m^3$)	Result
$PM_{2.5}$	76	24 hour Negligible MEG: 65	Retain as acute hazard

Legend: $\mu g/m^3$ = 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
$PM_{2.5}$	Peak: 76	Is > 24-hour Negligible MEG: 65, but < 24-hour Marginal MEG: 250	Negligible
	Average: 45	Is ≤ 24-hour Negligible MEG: 65	Negligible

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 $PM_{2.5}$

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: 76	Score 1: Concentration is below the 25th percentile of the severity range.	Score 2: Field data adequately estimate population exposure.	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: 45	Score 1: Concentration is less than or equal to the Negligible MEG	Score 2: Field data adequately estimate population exposure.	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
$PM_{2.5}$	Peak	Negligible	Unlikely	Low
	Average	Negligible	Unlikely	Low

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 . 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.

Three of the samples were invalid due to battery failure or missing flow rates.

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.

9.4 Risk Assessment

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

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.

An OEHSA was completed for Phoenix, Afghanistan on 1 January 2011. Update the OEHSA annually or as the exposure scenario changes.

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

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