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

MCHB-IP-RDE

21 JUN 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, 3-15 December 2010, U_AFG_KANDAHAR_CM_A10_20101215

1. The enclosed report details the assessment of particulate matter (PM) air samples collected by 4th Preventive Medicine Detachment personnel, Burn Pit, South Park, Board Walk, and Morale, Welfare, and Recreation (MWR), Kandahar, Afghanistan, 3-15 December 2010.

2. Based on the sample results and associated exposure information assessed in this report, the tactical risk estimate for PM_{10} at the Burn Pit, Board Walk, and MWR on both typical exposure and peak exposure days during the sampled timeframe is **moderate**. The tactical risk estimate for PM_{10} at the South Park on both typical exposure and peak exposure days during the sampled timeframe is **low**.

FOR THE DIRECTOR:

(b) (6)

Encl (b) (6)
Portfolio Director, Health Risk Management

CF: (w/encl)
5th PMD (Commander/CAPT (b) (6)
JSC-A (Environmental Science Officer/LT (b)
44th MED BDE (Force Health Protection Officer/MAJ (b) (6)
CJTF-101 (Command Surgeon Office/CPT (b) (6)
ARCENT (Command Surgeon Office/MAJ (b) (6)
ARCENT (Force Health Protection Officer/LTC (b) (6)
USAFSAM (LtCol (b)
CFLCC/USA 3D MDSC (Force Health Protection Officer/CPT (b) (6)
NMCPHC (Expeditionary Preventive Medicine/Mr. (b) (6)
MARFORCOM (Force Environmental Health Officer/LT (b) (6)

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

Deployment Occupational and Environmental Health Surveillance Sample Report,
U_AFG_KANDAHAR_CM_A10_20101215
Health Risk Management Portfolio

Airborne Particulate Matter, Kandahar, Afghanistan

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

ACKNOWLEDGMENTS

DEPLOYMENT OCCUPATIONAL AND ENVIRONMENTAL HEALTH SURVEILLANCE SAMPLE REPORT AIRBORNE PARTICULATE MATTER KANDAHAR, AFGHANISTAN 3-15 DECEMBER 2010 U_AFG_KANDAHAR_CM_A10_20101215

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 4th Preventive Medicine Detachment on 3-15 December 2010 at Burn Pit, South Park, Board Walk, and Morale, Welfare, and Recreation (MWR), 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 (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 Appendix B.

5 Exposure Setting

Appendix C contains information about the sampling location, environmental conditions, and associated potential population exposure for each sample site. 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 Appendix B. Correction and clarification of exposure assumptions by the sampling unit is encouraged.

6 Prescreen

Table 1 shows parameters identified as potential hazards because their peak single sample concentrations were 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 1 are not considered hazards. The pre-screening is conducted as described in USAPHC (Prov) TG 230, section 3.4.3. The sample results were compared to MEGs on 4 March 2011.

Table 1. Results of Prescreen

Parameter	Detections/ Samples	Peak Single Sample Concentration (µg/m^3)	1-year Negligible MEG (µg/m^3)	Result
PM_{10} at Burn Pit	2/2	935	none	Retain as potential hazard
PM_{10} at South Park	2/2	448	none	Retain as potential hazard
PM_{10} at Board Walk	2/2	749	none	Retain as potential hazard
PM_{10} at MWR	1/1	1165	none	Retain as potential hazard

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

7 Acute Risk Assessment

7.1 Acute Screen

Table 2 shows parameters identified as acute hazards because their peak sample day concentrations were greater than their acute screening MEGs. Acute hazards are further assessed to estimate the acute 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 2. Results of Acute Screen

Parameter	Peak Sample Day Concentration (µg/m^3)	Screening MEG (µg/m^3)	Result
PM_{10} at Burn Pit	935	24-hour Negligible MEG: 250	Retain as acute hazard
PM_{10} at South Park	448	24-hour Negligible MEG: 250	Retain as acute hazard
PM_{10} at Board Walk	749	24-hour Negligible MEG: 250	Retain as acute hazard
PM_{10} at MWR	1165	24-hour Negligible MEG: 250	Retain as acute hazard

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

7.2 Hazard Severity

Table 3 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 3. Hazard Severity

Parameter	Concentration (µg/m^3)	Comparison MEGs (µg/m^3)	Hazard Severity
PM_{10} at Burn Pit	Peak: 935	Is ≥ 24-hour Critical MEG: 600	Critical
	Average: 840	Is ≥ 24-hour Critical MEG: 600	Critical
PM_{10} at South Park	Peak: 448	Is > 24-hour Marginal MEG: 420, but < 24-hour Critical MEG: 600	Marginal
	Average: 419	Is > 24-hour Negligible MEG: 250, but < 24-hour Marginal MEG: 420	Negligible
PM_{10} at Board Walk	Peak: 749	Is ≥ 24-hour Critical MEG: 600	Critical
	Average: 636	Is ≥ 24-hour Critical MEG: 600	Critical
PM_{10} at MWR	Peak: 1165	Is ≥ 24-hour Critical MEG: 600	Critical
	Average: 1165	Is ≥ 24-hour Critical MEG: 600	Critical

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

7.3 Hazard Probability

Table 4 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. The detailed hazard probability scoring tables are provided in Appendix D.

Table 4. Hazard Probability

Parameter	Concentration ($\mu g/m^3$)	Hazard Probability
PM_{10} at Burn Pit	Peak: 935	Seldom
	Average: 840	Seldom
PM_{10} at South Park	Peak: 448	Unlikely
	Average: 419	Occasional
PM_{10} at Board Walk	Peak: 749	Seldom
	Average: 636	Seldom
PM_{10} at MWR	Peak: 1165	Seldom

7.4 Tactical Risk Estimate

Table 5 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 5. Risk Assessment Summary

Parameter	Type of Exposure	Hazard Severity	Hazard Probability	Tactical Risk Estimate
PM_{10} at Burn Pit	Peak	Critical	Seldom	Moderate
	Average	Critical	Seldom	Moderate
PM_{10} at South Park	Peak	Marginal	Unlikely	Low
	Average	Negligible	Occasional	Low
PM_{10} at Board Walk	Peak	Critical	Seldom	Moderate
	Average	Critical	Seldom	Moderate
PM_{10} at MWR	Peak	Critical	Seldom	Moderate

8 Conclusion

Refer to USAPHC (Prov) TG 230, Table 3-2 for the potential consequences to military operations and force readiness associated with this risk level.

Based on the sample results and associated exposure information assessed in this report, the tactical risk estimate for PM_{10} at the Burn Pit, Board Walk, and MWR on both typical exposure and peak exposure days during the sampled timeframe is **moderate**. The tactical risk estimate for PM_{10} at the South Park on both typical exposure and peak exposure days during the sampled timeframe is **low**.

9 Limitations

9.1 Field Data Quality

The field data sheets provided with the sample set were not adequately filled out. The post sample time was recorded incorrectly. The post sample time is the time the sample equipment stops actively sampling the air; not the time the sample collector returns to pick up the equipment/media.

The sample collected on 3 December 2010 at the MWR was invalid due to damaged media.

9.2 Sample Receipt at USAPHC (Prov) Laboratory

The sample set was packaged correctly.

9.3 Laboratory Data Quality

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 (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 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 (Prov), AIPH POCs for this assessment are Mrs. (b) (6) and Ms. (b) (6). Ms. (b) (6) may be contacted at e-mail (b) (6), and Ms. (b) may be contacted at e-mail (b) (6), DSN 312-584-6096 or commercial 001-410-436-6096.

(b) (6)

Environmental Scientist
Deployment Environmental Surveillance Program

Approved by:

(b) (6)

Acting Program Manager
Deployment Environmental Surveillance

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.

Appendix B

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
00003T50	AFG KANDAH 10193 PM10DPS	Board Walk	2010/12/03 1200	No
00003T4X	AFG KANDAH 10193 PM10DPS	Board Walk	2010/12/15 1420	No
00003T51	AFG KANDAH 10193 PM10DPS	Burn Pit	2010/12/03 1100	No
00003T4V	AFG KANDAH 10193 PM10DPS	Burn Pit	2010/12/15 1438	No
00003T4R	AFG KANDAH 10193 PM10DPS	MWR	2010/12/03 1215	Yes, Damaged Sampling Media
00003T4Z	AFG KANDAH 10193 PM10DPS	MWR	2010/12/15 1413	No
00003T4U	AFG KANDAH 10193 PM10DPS	South Park	2010/12/03 1210	No
00003T4Y	AFG KANDAH 10193 PM10DPS	South Park	2010/12/15 1400	No

Appendix C

Exposure Setting Information

Table C-1. Exposure Information at the Burn Pit

Questions About Exposure	Information Provided and Assumptions
What is the exposure event or ambient environmental condition under consideration?	Exposure to PM less than 10 micrometers in diameter (PM_{10}) and metals in the ambient air at this location.
What is the population at risk?	The population at Burn Pit.
What is the timeframe under consideration?	The samples were collected on 3-15 December 2010. This encompasses a timeframe of approximately 1 week 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 1 week is being considered.
What are the activity patterns of the exposed population?	Typical exertion across the base camp.
What is known about sources of potential contamination?	Burn pit.
What is known about the exposure setting?	The Burn Pit is a sample site at Kandahar, Afghanistan.
What are the exposure pathways?	Inhalation.
Where are the sampling sites relative to where exposure occurs?	Specific information about the sampler location was not provided.

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

Table C-2. Exposure Information at the South Park

Questions About Exposure	Information Provided and Assumptions
What is the exposure event or ambient environmental condition under consideration?	Exposure to PM less than 10 micrometers in diameter (PM_{10}) and metals in the ambient air at this location.
What is the population at risk?	The population at South Park.
What is the timeframe under consideration?	The samples were collected on 3-15 December 2010. This encompasses a timeframe of approximately 1 week 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 1 week is being considered.
What are the activity patterns of the exposed population?	Typical exertion across the base camp.
What is known about sources of potential contamination?	None provided.
What is known about the exposure setting?	The South Park is a sample site at Kandahar, Afghanistan.
What are the exposure pathways?	Inhalation.
Where are the sampling sites relative to where exposure occurs?	The sampler location was not provided.

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

Table C-3. Exposure Information at the Board Walk

Questions About Exposure	Information Provided and Assumptions
What is the exposure event or ambient environmental condition under consideration?	Exposure to PM less than 10 micrometers in diameter (PM_{10}) and metals in the ambient air at this location.
What is the population at risk?	The population at the Board Walk.
What is the timeframe under consideration?	The samples were collected on 3-15 December 2010. This encompasses a timeframe of approximately 1 week 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 1 week is being considered.
What are the activity patterns of the exposed population?	Typical exertion across the base camp.
What is known about sources of potential contamination?	None provided.
What is known about the exposure setting?	The Board Walk is a sample site at Kandahar, Afghanistan.
What are the exposure pathways?	Inhalation.
Where are the sampling sites relative to where exposure occurs?	The sampler location was not provided.

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

Table C-4. Exposure Information at the MWR

Questions About Exposure	Information Provided and Assumptions
What is the exposure event or ambient environmental condition under consideration?	Exposure to PM less than 10 micrometers in diameter (PM_{10}) and metals in the ambient air at this location.
What is the population at risk?	The population at the MWR.
What is the timeframe under consideration?	The samples were collected on 3-15 December 2010. Although this encompasses a timeframe of approximately 1 week from the first day of sampling to the last only one sample was valid therefore only this timeframe of 1 day (15 December 2011) is being considered.
What are the activity patterns of the exposed population?	Typical exertion across the base camp.
What is known about sources of potential contamination?	None provided.
What is known about the exposure setting?	The MWR is a sample site at Kandahar, Afghanistan.
What are the exposure pathways?	Inhalation.
Where are the sampling sites relative to where exposure occurs?	The sampler location was not provided.

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

Appendix D

Hazard Probability Scoring Tables

Table D-1. Hazard Probability Scoring for PM_{10} at Burn Pit

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: 935	Score 2: Concentration is >Critical MEG and next higher severity MEG does not exist.	Score 2: Field data adequately estimates population exposure (Routine Sampling).	Score 1: Field exposure duration to MEG exposure duration is <1 (Personnel will not spend the entire 24-hours at the sampling location).	Score 2: Typical exertion (no information to indicate otherwise).	Total Score 7: Seldom
Average: 840	Score 2: Concentration is >Critical MEG and next higher severity MEG does not exist.	Score 2: Field data adequately estimates population exposure (Routine Sampling).	Score 1: Field exposure duration to MEG exposure duration is <1 (Personnel will not spend the entire 24-hours at the sampling location).	Score 2: Typical exertion (no information to indicate otherwise).	Total Score 7: Seldom

Table D-2. Hazard Probability Scoring for PM_{10} at the South Park

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: 448	Score 1: Concentration is <25th percentile of severity range.	Score 2: Field data adequately estimates population exposure (Routine Sampling).	Score 1: Field exposure duration to MEG exposure duration is <1 (Personnel will not spend the entire 24-hours at the sampling location).	Score 2: Typical exertion (no information to indicate otherwise).	Total Score 6: Unlikely
Average: 419	Score 3: Concentration is >75th percentile of severity range.	Score 2: Field data adequately estimates population exposure (Routine Sampling).	Score 1: Field exposure duration to MEG exposure duration is <1 (Personnel will not spend the entire 24-hours at the sampling location).	Score 2: Typical exertion (no information to indicate otherwise).	Total Score 8: Occasional

Table D-3. Hazard Probability Scoring for PM_{10} at the Board Walk

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: 749	Score 2: Concentration is >Critical MEG and next higher severity MEG does not exist.	Score 2: Field data adequately estimates population exposure (Routine Sampling).	Score 1: Field exposure duration to MEG exposure duration is <1 (Personnel will not spend the entire 24-hours at the sampling location).	Score 2: Typical exertion (no information to indicate otherwise).	Total Score 7: Seldom
Average: 636	Score 2: Concentration is >Critical MEG and next higher severity MEG does not exist.	Score 2: Field data adequately estimates population exposure (Routine Sampling).	Score 1: Field exposure duration to MEG exposure duration is <1 (Personnel will not spend the entire 24-hours at the sampling location).	Score 2: Typical exertion (no information to indicate otherwise).	Total Score 7: Seldom

Table D-4. Hazard Probability Scoring for PM_{10} at the MWR

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: 1165	Score 2: Concentration is >Critical MEG and next higher severity MEG does not exist.	Score 2: Field data adequately estimates population exposure (Routine Sampling).	Score 1: Field exposure duration to MEG exposure duration is <1 (Personnel will not spend the entire 24-hours at the sampling location).	Score 2: Typical exertion (no information to indicate otherwise).	Total Score 7: Seldom