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US ARMY PUBLIC HEALTH COMMAND (PROVISIONAL)
5158 BLACKHAWK ROAD
ABERDEEN PROVING GROUND MD 21010-5403

MCHB-TS-RDE

16 MAR 2010

MEMORANDUM FOR Office of the Command Surgeon (LTC (b) (6)), US
Central Command, 7115 South Boundary Boulevard, MacDill Air Force Base,
FL 33621-5101

SUBJECT: Deployment Occupational and Environmental Health Risk Characterization,
Ambient Air Particulate Matter Samples, Dwyer, Afghanistan, 10-30 October 2009,
U_AFG_DWYER_CM_A25_20091030

1. The enclosed assessment details the occupational and environmental health (OEH) risk characterization for ambient air particulate matter (PM) samples collected by Bravo Medical Company, Preventive Medicine Unit personnel, Dwyer, Afghanistan, 10-30 October 2009. All 18 filters submitted are valid samples.
2. The OEH risk estimate for exposure to PM less than 2.5 micrometers in diameter (PM_{2.5}) and analyzed metals in the ambient air at the Preventive Medicine Tent, Dwyer, Afghanistan between 10-30 October 2009 is **moderate** due to elevated levels of PM_{2.5}. Exposure to the ambient air during this sampling event may have degraded unit readiness; periods with similar ambient conditions are expected to cause similar health effects.
3. The OEH risk estimate for exposure to PM_{2.5} and analyzed metals in the ambient air at the burn pit, Dwyer, Afghanistan between 11-29 October 2009 is **moderate** due to elevated levels of PM_{2.5}. Exposure to the ambient air during this sampling event may have degraded unit readiness; periods with similar ambient conditions are expected to cause similar health effects.

FOR THE COMMANDER:

(b) (6)

Encl

Director, Health Risk Management

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MCHB-TS-RDE

SUBJECT: Deployment Occupational and Environmental Health Risk Characterization,
Ambient Air Particulate Matter Samples, Dwyer, Afghanistan, 10-30 October 2009,
U_AFG_DWYER_CM_A25_20091030

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U.S. Army Public Health Command (Provisional)

DEPLOYMENT OCCUPATIONAL AND ENVIRONMENTAL
HEALTH RISK CHARACTERIZATION
AMBIENT AIR PARTICULATE MATTER SAMPLES
DWYER, AFGHANISTAN
10-30 OCTOBER 2009
U_AFG_DWYER_CM_A25_20091030

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Preventive Medicine Survey: 40-5f1

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DEPLOYMENT OCCUPATIONAL AND ENVIRONMENTAL
HEALTH RISK CHARACTERIZATION
AMBIENT AIR PARTICULATE MATTER SAMPLES
DWYER, AFGHANISTAN
10-30 OCTOBER 2009
U_AFG_DWYER_CM_A25_20091030

1. REFERENCES. See Appendix A for a list of references.

2. PURPOSE AND SCOPE. This occupational and environmental health (OEH) risk characterization addresses the analytical results for ambient air particulate matter less than 2.5 micrometers in diameter (PM_{2.5}) and metals samples collected between 10-30 October 2009 at Dwyer, Afghanistan in accordance with U.S. Department of Defense medical surveillance requirements. All 18 filters submitted are valid samples. This sample set was assessed using the methodology described in Appendix B. This report should not be considered a complete assessment of the overall OEH hazards to which troops may be exposed at Dwyer, Afghanistan.

3. BACKGROUND AND EXPOSURE ASSUMPTIONS. Ambient air PM_{2.5} and metals samples were collected from the Preventive Medicine Tent and the burn pit between 10-30 October 2009. There is no known industry present in the vicinity. No adverse weather conditions were reported for the sampling event. All personnel are expected to remain at this location for approximately 1 year. A conservative (protective) assumption used in this risk characterization is that all personnel inhale the ambient air 24 hours/day for 365 days (1 year). In addition, it is assumed that control measures and/or personal protective equipment are not used.

4. SAMPLE COLLECTION AND ANALYSIS.

a. Sample Collection. This ambient air PM_{2.5} and metals sample set was collected using the Deployable Particulate Sampler (DPS™) apparatus. Appendix C presents a summary of the PM filters submitted by Bravo Medical Company, Preventive Medicine Unit personnel. (DPS™ is a trademark of SKC, Inc.)

b. Laboratory Analysis. The U.S. Army Public Health Command (Provisional) (USAPHC (Prov)), formerly U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM), laboratory weighs the ambient air PM filters to determine PM mass and calculate a concentration. The USAPHC (Prov) laboratory analyzes the filters to determine metals concentrations. Metals detected above the laboratory reportable limit were compared to military exposure guidelines (MEGs) published in USACHPPM

Use of trademarked name(s) does not imply endorsement by the U.S. Army but is intended only to assist in the identifications of a specific product.

Technical Guide 230, while PM_{2.5} concentrations were assessed using the methodology described in Appendix B. Appendix C shows a summary of the filters assessed in this report. Appendices D and E show sample results summary tables. Appendices F through I show complete analytical results.

5. HAZARD IDENTIFICATION.

a. Particulate Matter. Since PM was measured at a concentration above the Air Quality Index good range, PM is identified as a potential health threat requiring further assessment. Air particulates include solid particles and liquid droplets, emitted directly into the air by sources, such as power plants, motor vehicles, aircraft, generators, construction activities, fires, and natural windblown dust. Airborne particulates can include dust, silica, soil, metals, organic compounds, allergens, and compounds, such as, nitrates or sulfates formed by condensation or transformation of combustion exhaust. Particulate chemical composition and size vary considerably depending on the source.

b. Metals. No metals were found at concentrations greater than their respective MEGs. Therefore, the OEH risk estimate for exposure to metals in the ambient air at this location is considered **low**.

6. HAZARD ASSESSMENT-PREVENTIVE MEDICINE TENT.

a. Hazard Severity. The average concentration of PM_{2.5} was 1,131 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$). This concentration falls within the range of concentrations believed to pose significant respiratory effects in generally healthy troops causing some operational impact, particularly if the exposures are repeated or continuous. Uniquely susceptible personnel, such as those with asthma have an even greater risk because exposures may induce asthma attacks. Heavy aerobic activity may exacerbate health effects caused by PM. Therefore, the hazard severity is considered marginal.

b. Hazard Probability. The hazard probability reflects the likelihood that the exposures at the location are represented by the concentrations used to determine the hazard severity. Although the average PM_{2.5} sample concentration was within the marginal severity range, it is important to examine the individual samples to determine whether the average concentration is dominated by outliers or if it is representative of a typical exposure. The probability that the severity of a hazard is marginal is based on a comparison of individual sample concentrations to the lowest bound of the marginal category ($150 \mu\text{g}/\text{m}^3$). During this sampling event, the range of PM_{2.5} sample concentrations was 42-8,916 $\mu\text{g}/\text{m}^3$, and three of nine (33 percent) of samples were above $150 \mu\text{g}/\text{m}^3$; therefore, the probability that personnel in the sampled area will be exposed to PM_{2.5} greater than $150 \mu\text{g}/\text{m}^3$ is considered seldom.

c. Risk Estimate and Confidence. Table 1 summarizes the risk estimate for each identified hazard.

Table 1. Risk Estimate Summary for Exposure to PM_{2.5} and Metals in Ambient Air, Preventive Medicine Tent, Dwyer, Afghanistan, 10-30 October 2009

Parameter	Hazard Severity	Hazard Probability	Hazard-Specific Risk Estimate	Operational Risk Estimate	Confidence
PM _{2.5}	Marginal	Seldom	MODERATE	MODERATE	LOW
Metals	No parameters detected above a MEG		LOW		

7. HAZARD ASSESSMENT–BURN PIT.

a. Hazard Severity. The average concentration of PM_{2.5} was 144 µg/m³. This concentration falls within the range of concentrations believed to pose significant health concerns to susceptible groups, which in the military can include asthmatics or persons with pre-existing cardiopulmonary disease. Otherwise, generally healthy troops may have some eye, nasal, or throat irritation causing little or no impact on unit readiness. Therefore, the hazard severity is considered negligible.

b. Hazard Probability. The hazard probability reflects the likelihood that the exposures at the location are represented by the concentrations used to determine the hazard severity. Although the average PM_{2.5} sample concentration was within the negligible severity range, it is important to examine the individual samples to determine whether the average concentration is dominated by outliers or if it is representative of a typical exposure. The probability that the severity of a hazard is negligible is based on a comparison of individual sample concentrations to the PM_{2.5} 24-hour National Ambient Air Quality Standards (NAAQS) of 35 µg/m³. During this sampling event, the range of PM_{2.5} sample concentrations was 46-226 µg/m³, and nine of nine (100 percent) of samples were above 35 µg/m³; therefore, the probability that personnel in the sampled area(s) will be exposed to PM_{2.5} greater than 35 µg/m³ is considered frequent.

c. Risk Estimate and Confidence. Table 2 summarizes the risk estimate for each identified hazard.

Table 2. Risk Estimate Summary for Exposure to PM_{2.5} and Metals in Ambient Air, Burn Pit, Dwyer, Afghanistan, 11-29 October 2009

Parameter	Hazard Severity	Hazard Probability	Hazard-Specific Risk Estimate	Operational Risk Estimate	Confidence
PM _{2.5}	Negligible	Frequent	MODERATE	MODERATE	LOW
Metals	No parameters detected above a MEG		LOW		

8. CONCLUSION.

a. The OEH risk estimate for exposure to PM_{2.5} and analyzed metals in ambient air at the Preventive Medicine tent, Dwyer, Afghanistan, 10-30 October 2009 is **moderate** due to elevated levels of PM_{2.5}. Exposure to the ambient air during this sampling event may have degraded unit readiness; periods with similar ambient conditions are expected to cause similar health effects.

b. The OEH risk estimate for exposure to PM_{2.5} and analyzed metals in ambient air at the burn pit, Dwyer, Afghanistan, 11-29 October 2009 is **moderate** due to elevated levels of PM_{2.5}. Exposure to the ambient air during this sampling event may have degraded unit readiness; periods with similar ambient conditions are expected to cause similar health effects.

9. RECOMMENDATIONS AND NOTES.

a. Recommendations.

(1) Collect PM samples from this location at least once every 6 days (if possible) for the deployment duration (or as long as possible) to better characterize the ambient air PM and metals exposures.

(2) Restrict outdoor physical activities where possible during periods of visibly high particulate levels.

(3) Inform preventive medicine and medical personnel of potential health effects resulting from exposures to the measured levels of ambient PM and associated heavy metals. Disease Non-Battle Injury (DNBI) rates of respiratory diseases, particularly asthma, should be followed and assessed during periods of high PM levels. If elevated DNBI respiratory illness rates (that is, above two standard deviations), or an increase in the incidence or severity of asthma, are noted during periods of high PM levels, ensure appropriate medical surveillance-related items are documents. If assistance and/or

information are needed on environmental health effects and/or medical implications from exposure to PM and associated heavy metals, please contact the USAPHC (Prov) Environmental Medicine Program at commercial 001-410-436-2714.

b. Notes.

(1) This OEH risk assessment is specific to the exposure assumptions identified above and the sample results assessed in this report. If the assumed exposure scenario changes or additional information is available, provide the updated information so the risk estimate can be reassessed. If additional samples from this site and/or area are collected, a new OEH risk assessment will be completed.

(2) As part of a Comprehensive Military Medical Surveillance Program, required by Department of Defense Directive 6490.02E and Department of Defense Instruction 6490.03, this report has been submitted to the Occupational and Environmental Health Surveillance (OEHS)-Data Portal. You can view this and other archived OEHS data at <https://doehrswww.apgea.army.mil/doehrs-oehs/>. If you have additional OEHS data for Dwyer, Afghanistan it can also be submitted via this Web site.

10. POINTS OF CONTACT. The USAPHC (Prov) points of contact for this assessment are Ms. (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).

(b) (6)

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Supervisory Environmental Scientist
Deployment Environmental Surveillance
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Approved by:

(b) (6)

MAJ, MS
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, Field Manual (FM) 5-19, Composite Risk Management, 21 August 2006.
4. U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) Technical Guide 230, Chemical Exposure Guidelines for Deployed Military Personnel, Version 1.3, May 2003 with the January 2004 addendum.
5. Memorandum, USACHPPM (MCHB-TS-RDE), 27 April 2007, Subject: Deployment Operational Risk Characterization Method for Particulate Matter.

APPENDIX B

METHODOLOGY

B-1. SCOPE OF RISK ASSESSMENTS. The U.S. Army Public Health Command (Provisional) (USAPHC (Prov)), formerly U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM), Deployment Environmental Surveillance Program (DESP) characterizes deployment occupational and environmental health (OEH) risks which may impact mission capability (that is, operational risks). Each characterization is performed using risk management doctrine (Field Manual (FM) 5-19), and the relatively conservative (protective) assumptions and methods provided in the USACHPPM Technical Guide (TG) 230, to facilitate decision making that can minimize the likelihood of significant risks. A risk estimate is generated for each sample or sample set sent to the USAPHC (Prov) laboratory for analysis. These risk estimates are provided to preventive medicine personnel with information about potential operational risks and associated health effects. Samples received are generally limited in time, area, and media. Therefore, any risk characterization based on a sample or sample set should not be considered a complete characterization of the overall OEH hazards to which troops may be exposed at a location.

B-2. RISK ASSESSMENT METHODOLOGY.

a. General. The USACHPPM TG 230 methodology (identification of the hazard(s), assessment of the hazard severity and probability, and determination of a risk estimate and confidence level), military exposure guidelines (MEGs), and National Ambient Air Quality Standards (NAAQS) are used to characterize the risk from identified OEH hazards. Each component of the methodology is described in more detail below.

b. Hazard Identification.

(1) Hazard Definition. For the purpose of conducting these risk assessments, an OEH hazard is any biological, chemical, or physical parameter detected in a medium by field testing or laboratory analysis. The detected parameter could pose a health threat if personnel are exposed to it at levels greater than its respective MEG.

(2) Screening the Hazards.

(a) General. The purpose of screening the hazards is to focus the risk assessment on the most important/credible health threats. Concentrations of identified hazards are screened against the long-term (1-year) MEGs. The 1-year MEGs represent exposure concentrations at or below which no significant health effects

(including delayed or chronic disease or significant increased risk of cancer) are anticipated even after 1 year of continuous daily exposures. For exposures that are known to be brief or intermittent (such as, 24 hours, less than 2 weeks, etc.), short-term MEGs can be used (when available).

(b) Ambient Air Particulate Matter. Particulate matter is one of six air pollutants for which the U.S. Environmental Protection Agency (USEPA) has promulgated NAAQS in the interest of protecting public health. In addition, the USEPA developed the Air Quality Index (AQI) to communicate daily air quality to the public using six descriptive categories ranging from “good” to “hazardous.” The AQI categories for PM are based on concentration ranges grouped according to health concern severity. The USAPHC (Prov) uses the AQI categories to characterize the operational risk from PM. Particulate matter sample concentrations are screened against the upper bound of the AQI good air quality concentration range. If any PM sample concentration is above this threshold, PM is identified as a hazard.

(3) Hazards that are Not Credible Health Threats. If concentrations of identified hazards are below the screening MEGs, it can be assumed that they do not pose a health threat. In these cases, a hazard assessment is not conducted and the estimated risk from exposure to these hazards is assumed to be low.

(4) Hazards that are Credible Health Threats. If concentrations of identified hazards are above the screening MEGs, they are considered credible health threats, and a hazard assessment is conducted for each one.

c. Hazard Assessment.

(1) Hazard Severity.

(a) General. When concentrations of an OEH hazard are greater than the screening MEG, the severity of the health threat associated with the hazard must be estimated. Determine whether the concentration of the hazard also exceeds short-term guidelines. Significant health and/or mission impacts may be anticipated when both long and short term guidelines are exceeded. Many OEH hazards with long-term guidelines have no parallel short-term guidelines. In such cases, professional judgment is necessary to estimate the hazard severity. Estimating the hazard severity involves determining the proportion of individuals within the population of interest that will experience effects and the severity of the effects. In practice, this can be difficult due to the limited and variable toxicological and epidemiological data available for most OEH hazards. Conclusions about the hazard severity must be made with an understanding

of the limitations of currently available data used to develop the MEGs and the risk assessment process in general.

(b) Multiple Samples. The average concentration of the OEH hazard is compared to the short and long-term MEGs to determine hazard severity for sample sets where samples are collected on different days or multiple samples are collected on the same day from the same source.

(c) Ambient Air Particulate Matter. Hazard severity is determined by comparing the average PM concentration for a specific location and timeframe to PM concentration ranges identified as either negligible or marginal. This process is described in more detail in Appendix A, reference 5. Negligible concentration levels correspond to mild respiratory effects among generally healthy troops, with more significant effects among sensitive persons, such as asthmatics or those with existing cardiopulmonary disease. Marginal concentration levels are expected to pose more significant health effects among healthy personnel, and those with pre-existing sensitivities.

(2) Hazard Probability.

(a) General. The hazard probability represents the likelihood that individuals within a population of interest during a specified time period will actually be exposed to concentrations of an OEH hazard that are greater than a MEG. The MEGs were developed using certain conservative exposure assumptions that may not reflect actual exposure conditions. The primary factors in estimating the hazard probability are how closely actual exposure conditions match those used to develop the MEG, and what proportion of the population of interest will be exposed to the hazard.

(b) Ambient Air Particulate Matter. Hazard probability is based on the frequency that anticipated exposures are above a threshold that is representative of the hazard severity category. This process is described in more detail in Appendix A, reference 5. However, using TG 230 methodology and reference 1d to estimate the hazard probability for PM when a small number of samples are collected or number of days that are sampled often results in a risk estimate that is not consistent with actual exposure outcomes. Until a more refined assessment method can be published in TG 230, the method the USAPHC (Prov) DESP uses to characterize the risk from PM deviates slightly from TG 230 and reference 1d. When less than four samples are collected or number of days are sampled and received for risk characterization, a hazard probability is not estimated; the hazard severity determines the risk estimate. A negligible severity represents a low risk and a marginal severity represents a moderate risk.

(3) Risk Estimate.

(a) The estimated hazard severity and probability levels are used with the Risk Assessment Matrix published in TG 230 and FM 5-19 to provide a risk estimate for exposure to each OEH hazard identified as a credible health threat. Therefore, communication of operational risks from OEH hazards can be made in the same context as other operational risks. The risk estimate is based on the highest estimated risk for the OEH hazards identified. Each level of operational risk has a defined mission impact and unit status description.

(b) Each risk estimate is specific to exposure assumptions derived from information on the field data sheets, communication with the collecting unit, and the associated sample results. If the assumed exposure scenario changes, additional/updated information should be provided so the risk estimate can be reassessed.

(c) If additional samples from this location and source are collected, a new risk estimate will be generated based upon exposure scenario information provided with the samples.

(4) Confidence. A confidence level is assigned to each risk estimate. The degree of confidence is particularly important when determining possible courses of action. The confidence level should integrate uncertainties associated with the hazard severity and probability determinations. Typical areas of uncertainty include: sampling or field data quality; actual exposure conditions and comparability to the exposure assumptions used to develop the MEGs or other comparison level; expected symptoms of exposure, including consideration of exposure to multiple hazards; and whether the predicted health outcome is plausible, given weight of evidence or real-world experiences. In general, confidence in risk estimates is usually low to medium.

Deployment OEH Risk Characterization, Ambient Air PM Samples, Dwyer, Afghanistan, 10-30 Oct 09,
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APPENDIX C

INFORMATION SUMMARY
 AMBIENT AIR PARTICULATE MATTER SAMPLES
 DWYER, AFGHANISTAN
 10-30 OCTOBER 2009

DOEHRS Sample ID	Field/Local Sample ID	Site	Start Date/Time	Sample Duration	Valid	Filter ID
00001HQY	AFG_DWYER_09283_PM25DPS	Preventive Medicine Tent	2009/10/10 1030	1440.0 minutes	Yes	47-09-1726
00001HQZ	AFG_DWYER_09284_PM25DPS	Preventive Medicine Tent	2009/10/11 1030	1440.0 minutes	Yes	47-09-1728
00001HRP	AFG_DWYER_09284_PM25DPS	Burn Pit	2009/10/11 1130	1440.0 minutes	Yes	47-09-1727
00001HR2	AFG_DWYER_09285_PM25DPS	Preventive Medicine Tent	2009/10/12 1030	1440.0 minutes	Yes	47-09-1702
00001HSK	AFG_DWYER_09285_PM25DPS	Burn Pit	2009/10/12 1130	1440.0 minutes	Yes	47-09-1703
00001HR3	AFG_DWYER_09286_PM25DPS	Preventive Medicine Tent	2009/10/13 1030	1440.0 minutes	Yes	47-09-1729
00001HT6	AFG_DWYER_09286_PM25DPS	Burn Pit	2009/10/13 1130	1440.0 minutes	Yes	47-09-1704
00001HR6	AFG_DWYER_09287_PM25DPS	Preventive Medicine Tent	2009/10/14 1030	1440.0 minutes	Yes	47-09-1730
00001HT7	AFG_DWYER_09287_PM25DPS	Burn Pit	2009/10/14 1130	1440.0 minutes	Yes	47-09-1705

Deployment OEH Risk Characterization, Ambient Air PM Samples, Dwyer, Afghanistan, 10-30 Oct 09,
 U_AFG_DWYER_CM_A25_20091030

DOEHRS Sample ID	Field/Local Sample ID	Site	Start Date/Time	Sample Duration	Valid	Filter ID
00001HR7	AFG_DWYER_09288_PM25DPS	Preventive Medicine Tent	2009/10/15 1030	1440.0 minutes	Yes	47-09-1731
00001HT9	AFG_DWYER_09288_PM25DPS	Burn Pit	2009/10/15 1130	1440.0 minutes	Yes	47-09-1732
00001HRA	AFG_DWYER_09289_PM25DPS	Preventive Medicine Tent	2009/10/16 1030	1440.0 minutes	Yes	47-09-1706
00001HTJ	AFG_DWYER_09289_PM25DPS	Burn Pit	2009/10/16 1130	1440.0 minutes	Yes	47-09-1707
00001HTP	AFG_DWYER_09290_PM25DPS	Burn Pit	2009/10/17 1130	1440.0 minutes	Yes	47-09-1733
00001HRG	AFG_DWYER_09297_PM25DPS	Preventive Medicine Tent	2009/10/24 1030	1440.0 minutes	Yes	47-09-1745
00001HU2	AFG_DWYER_09297_PM25DPS	Burn Pit	2009/10/24 1130	1440.0 minutes	Yes	47-09-1710
00001HRL	AFG_DWYER_09302_PM25DPS	Burn Pit	2009/10/29 1745	1440.0 minutes	Yes	47-09-1712
00001HRM	AFG_DWYER_09303_PM25DPS	Preventive Medicine Tent	2009/10/30 1230	1440.0 minutes	Yes	47-09-1714

LEGEND:

DOEHRS Sample ID = Defense Occupational and Environmental Health Readiness System Sample Identification Number

APPENDIX D

RESULTS SUMMARY
 AMBIENT AIR PARTICULATE MATTER SAMPLES
 PREVENTIVE MEDICINE TENT, DWYER, AFGHANISTAN
 10-30 OCTOBER 2009

Parameter ¹	Class	Units	Concentration		Valid Samples		USACHPPM TG230 Military Exposure Guidelines ³ (MEG)	
			Maximum	Average ²	#	# > Laboratory Reporting Limit	1-year	
							# > MEG	MEG
Manganese	Metals	µg/m ³	0.25529	0.099232	9	2	0	3.4
PM _{2.5}		µg/m ³	8916	1131	9	9	9	15

¹Highlighted values indicate the parameter was detected at a concentration above a MEG.

²Where parameters are not detected in a sample during analyses, half of the laboratory reporting limit is used in the average.

³This table was created from DOEHRS on 30 November 2009. The MEGs in DOEHRS are current as of June 2009.

LEGEND:

µg/m³ = micrograms per cubic meter

USACHPPM = U.S. Center for Health Promotion and Preventive Medicine

TG = Technical Guide

MEG = Military Exposure Guideline

PM_{2.5} = Particulate matter less than 2.5 micrometers in diameter

APPENDIX E

RESULTS SUMMARY
 AMBIENT AIR PARTICULATE MATTER SAMPLES
 BURN PIT, DWYER, AFGHANISTAN
 10-30 OCTOBER 2009

Parameter ¹	Class	Units	Concentration		Valid Samples		USACHPPM TG230 Military Exposure Guidelines ³ (MEG)	
			Maximum	Average ²	#	# > Laboratory Reporting Limit	1-year	
							# > MEG	MEG
Antimony	Metals	µg/m ³	0.15067	0.050079	9	2	0	12
PM _{2.5}		µg/m ³	226	144	9	9	9	15

¹Highlighted values indicate the parameter was detected at a concentration above a MEG.

²Where parameters are not detected in a sample during analyses, half of the laboratory reporting limit is used in the average.

³This table was created from DOEHRS on 30 November 2009. The MEGs in DOEHRS are current as of June 2009.

LEGEND:

µg/m³ = micrograms per cubic meter

USACHPPM = U.S. Center for Health Promotion and Preventive Medicine

TG = Technical Guide

MEG = Military Exposure Guideline

PM_{2.5} = Particulate matter less than 2.5 micrometers in diameter

Deployment OEH Risk Characterization, Ambient Air PM Samples, Dwyer, Afghanistan, 10-30 Oct 09,
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APPENDIX F

ANALYTICAL SAMPLE RESULTS
AMBIENT AIR PARTICULATE MATTER SAMPLES
DWYER, AFGHANISTAN
10-14 OCTOBER 2009

DOEHRS Sample ID			00001HQY	00001HQZ	00001HR2	00001HR3	00001HR6
Field/Local Sample ID			AFG_DWYER_09283_PM25DPS	AFG_DWYER_09284_PM25DPS	AFG_DWYER_09285_PM25DPS	AFG_DWYER_09286_PM25DPS	AFG_DWYER_09287_PM25DPS
Site			Preventive Medicine Tent	Preventive Medicine Tent	Preventive Medicine Tent	Preventive Medicine Tent	Preventive Medicine Tent
Start Date/Time			2009/10/10 1030	2009/10/11 1030	2009/10/12 1030	2009/10/13 1030	2009/10/14 1030
Parameter	Class	Units	Concentration ^{1,2}				
Antimony	Metals	µg/m ³	< 0.066138	< 0.066138	< 0.066138	< 0.066138	< 0.067422
Arsenic	Metals	µg/m ³	< 0.033069	< 0.033069	< 0.033069	< 0.033069	< 0.033711
Beryllium	Metals	µg/m ³	< 0.033069	< 0.033069	< 0.033069	< 0.033069	< 0.033711
Cadmium	Metals	µg/m ³	< 0.033069	< 0.033069	< 0.033069	< 0.033069	< 0.033711
Chromium	Metals	µg/m ³	< 0.033069	< 0.033069	< 0.033069	< 0.033069	< 0.033711
Lead	Metals	µg/m ³	< 0.066138	< 0.066138	< 0.066138	< 0.066138	< 0.067422
Manganese	Metals	µg/m ³	< 0.13228	0.17857	0.25529	< 0.13228	< 0.13484
Nickel	Metals	µg/m ³	< 0.033069	< 0.033069	< 0.033069	< 0.033069	< 0.033711
PM _{2.5}		µg/m ³	8916	278	404	101	118
Vanadium	Metals	µg/m ³	< 0.13228	< 0.13228	< 0.13228	< 0.13228	< 0.13484
Zinc	Metals	µg/m ³	< 0.33069	< 0.33069	< 0.33069	< 0.33069	< 0.33711

¹< X.XX = Below laboratory reporting limit (X.XX)

²Laboratory reporting limit is parameter and sample specific

Deployment OEH Risk Characterization, Ambient Air PM Samples, Dwyer, Afghanistan, 10-30 Oct 09,
U_AFG_DWYER_CM_A25_20091030

LEGEND:

DOEHRS Sample ID = Deployment Occupational and Environmental Health Readiness System Sample Identification Number

PM_{2.5} = Particulate matter less than 2.5 micrometers in diameter

µg/m³ = micrograms per cubic meter

Deployment OEH Risk Characterization, Ambient Air PM Samples, Dwyer, Afghanistan, 10-30 Oct 09,
 U_AFG_DWYER_CM_A25_20091030

APPENDIX G

ANALYTICAL SAMPLE RESULTS
 AMBIENT AIR PARTICULATE MATTER SAMPLES
 DWYER, AFGHANISTAN
 15-30 OCTOBER 2009

DOEHRS Sample ID			00001HR7	00001HRA	00001HRG	00001HRM
Field/Local Sample ID			AFG_DWYER_09288_PM 25DPS	AFG_DWYER_09289_PM 25DPS	AFG_DWYER_09297_PM25 DPS	AFG_DWYER_09303_PM25 DPS
Site			Preventive Medicine Tent	Preventive Medicine Tent	Preventive Medicine Tent	Preventive Medicine Tent
Start Date/Time			2009/10/15 1030	2009/10/16 1030	2009/10/24 1030	2009/10/30 1230
Parameter	Class	Units	Concentration ^{1,2}			
Antimony	Metals	µg/m ³	< 0.067422	< 0.067422	< 0.064300	< 0.060386
Arsenic	Metals	µg/m ³	< 0.033711	< 0.033711	< 0.032150	< 0.030193
Beryllium	Metals	µg/m ³	< 0.033711	< 0.033711	< 0.032150	< 0.030193
Cadmium	Metals	µg/m ³	< 0.033711	< 0.033711	< 0.032150	< 0.030193
Chromium	Metals	µg/m ³	< 0.033711	< 0.033711	< 0.032150	< 0.030193
Lead	Metals	µg/m ³	< 0.067422	< 0.067422	< 0.064300	< 0.060386
Manganese	Metals	µg/m ³	< 0.13484	< 0.13484	< 0.12860	< 0.12077
Nickel	Metals	µg/m ³	< 0.033711	< 0.033711	< 0.032150	< 0.030193
PM _{2.5}		µg/m ³	42	105	107	106
Vanadium	Metals	µg/m ³	< 0.13484	< 0.13484	< 0.12860	< 0.12077
Zinc	Metals	µg/m ³	< 0.33711	< 0.33711	< 0.32150	< 0.30193

¹< X.XX = Below laboratory reporting limit (X.XX)

²Laboratory reporting limit is parameter and sample specific

Deployment OEH Risk Characterization, Ambient Air PM Samples, Dwyer, Afghanistan, 10-30 Oct 09,
U_AFG_DWYER_CM_A25_20091030

LEGEND:

DOEHRS Sample ID = Deployment Occupational and Environmental Health Readiness System Sample Identification Number

PM_{2.5} = Particulate matter less than 2.5 micrometers in diameter

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Deployment OEH Risk Characterization, Ambient Air PM Samples, Dwyer, Afghanistan, 10-30 Oct 09,
U_AFG_DWYER_CM_A25_20091030

APPENDIX H

ANALYTICAL SAMPLE RESULTS
 AMBIENT AIR PARTICULATE MATTER SAMPLES
 DWYER, AFGHANISTAN
 11-14, 29 OCTOBER 2009

DOEHRS Sample ID			00001HRL	00001HRP	00001HSK	00001HT6	00001HT7
Field/Local Sample ID			AFG_DWYER_09302 _PM25DPS	AFG_DWYER_09284 _PM25DPS	AFG_DWYER_09285 _PM25DPS	AFG_DWYER_09286_ PM25DPS	AFG_DWYER_09287_ PM25DPS
Site			Burn Pit	Burn Pit	Burn Pit	Burn Pit	Burn Pit
Start Date/Time			2009/10/29 1745	2009/10/11 1130	2009/10/12 1130	2009/10/13 1130	2009/10/14 1130
Parameter	Class	Units	Concentration ^{1,2}				
Antimony	Metals	µg/m ³	< 0.068083	0.1022	< 0.065514	< 0.065514	< 0.065514
Arsenic	Metals	µg/m ³	< 0.034041	< 0.032757	< 0.032757	< 0.032757	< 0.032757
Beryllium	Metals	µg/m ³	< 0.034041	< 0.032757	< 0.032757	< 0.032757	< 0.032757
Cadmium	Metals	µg/m ³	< 0.034041	< 0.032757	< 0.032757	< 0.032757	< 0.032757
Chromium	Metals	µg/m ³	< 0.034041	< 0.032757	< 0.032757	< 0.032757	< 0.032757
Lead	Metals	µg/m ³	< 0.068083	< 0.065514	< 0.065514	< 0.065514	< 0.065514
Manganese	Metals	µg/m ³	< 0.13617	< 0.13103	< 0.13103	< 0.13103	< 0.13103
Nickel	Metals	µg/m ³	< 0.034041	< 0.032757	< 0.032757	< 0.032757	< 0.032757
PM _{2.5}		µg/m ³	46	141	146	176	126
Vanadium	Metals	µg/m ³	< 0.13617	< 0.13103	< 0.13103	< 0.13103	< 0.13103
Zinc	Metals	µg/m ³	< 0.34041	< 0.32757	< 0.32757	< 0.32757	< 0.32757

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Deployment OEH Risk Characterization, Ambient Air PM Samples, Dwyer, Afghanistan, 10-30 Oct 09,
U_AFG_DWYER_CM_A25_20091030

LEGEND:

DOEHRS Sample ID = Deployment Occupational and Environmental Health Readiness System Sample Identification Number

PM_{2.5} = Particulate matter less than 2.5 micrometers in diameter

µg/m³ = micrograms per cubic meter

Deployment OEH Risk Characterization, Ambient Air PM Samples, Dwyer, Afghanistan, 10-30 Oct 09,
 U_AFG_DWYER_CM_A25_20091030

APPENDIX I

ANALYTICAL SAMPLE RESULTS
 AMBIENT AIR PARTICULATE MATTER SAMPLES
 DWYER, AFGHANISTAN
 15-24 OCTOBER 2009

DOEHRS Sample ID			00001HT9	00001HTJ	00001HTP	00001HU2
Field/Local Sample ID			AFG_DWYER_09288_PM2 5DPS	AFG_DWYER_09289_PM2 5DPS	AFG_DWYER_09290_PM25 DPS	AFG_DWYER_09297_PM2 5DPS
Site			Burn Pit	Burn Pit	Burn Pit	Burn Pit
Start Date/Time			2009/10/15 1130	2009/10/16 1130	2009/10/17 1130	2009/10/24 1130
Parameter	Class	Units	Concentration ^{1,2}			
Antimony	Metals	µg/m ³	< 0.065514	< 0.062004	0.15067	< 0.062004
Arsenic	Metals	µg/m ³	< 0.032757	< 0.031002	< 0.031002	< 0.031002
Beryllium	Metals	µg/m ³	< 0.032757	< 0.031002	< 0.031002	< 0.031002
Cadmium	Metals	µg/m ³	< 0.032757	< 0.031002	< 0.031002	< 0.031002
Chromium	Metals	µg/m ³	< 0.032757	< 0.031002	< 0.031002	< 0.031002
Lead	Metals	µg/m ³	< 0.065514	< 0.062004	< 0.062004	< 0.062004
Manganese	Metals	µg/m ³	< 0.13103	< 0.12401	< 0.12401	< 0.12401
Nickel	Metals	µg/m ³	< 0.032757	< 0.031002	< 0.031002	< 0.031002
PM _{2.5}		µg/m ³	226	168	142	125
Vanadium	Metals	µg/m ³	< 0.13103	< 0.12401	< 0.12401	< 0.12401
Zinc	Metals	µg/m ³	< 0.32757	< 0.31002	< 0.31002	< 0.31002

¹< X.XX = Below laboratory reporting limit (X.XX)

²Laboratory reporting limit is parameter and sample specific

Deployment OEH Risk Characterization, Ambient Air PM Samples, Dwyer, Afghanistan, 10-30 Oct 09,
U_AFG_DWYER_CM_A25_20091030

LEGEND:

DOEHRS Sample ID = Deployment Occupational and Environmental Health Readiness System Sample Identification Number

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