



DEPARTMENT OF THE ARMY
US ARMY CENTER FOR HEALTH PROMOTION AND PREVENTIVE MEDICINE
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MCHB-TS-RDE

MEMORANDUM FOR Command Surgeon Office (MAJ (b) (6)), U.S. Central Command, 7115 South Boundary Boulevard, MacDill Air Force Base, FL 33621-5101

SUBJECT: Deployment Occupational and Environmental Health Risk Characterization, Camp Hurso, Ethiopia, 21 to 23 February 2007, U_ETH_HURSO_CM_A10_20070223

1. The enclosed report details the occupational and environmental health (OEH) risk characterization for six ambient air samples collected by Combined Joint Task Force–Horn of Africa Surgeon Cell personnel at Camp Hurso, Ethiopia, 21 to 23 February 2007.
2. The OEH risk estimate for exposure to particulate matter less than 10 micrometers in diameter (PM₁₀) and metals in the ambient air at Camp Hurso is **low**. The PM₁₀ was measured above the annual National Ambient Air Quality Standard of 50 micrograms per cubic meter. Exposure to the ambient air is expected to have little or no impact on unit readiness.

FOR THE COMMANDER:

(b) (6)

Encl

Director, Health Risk Management

CF: (w/encl)

CJTF-HOA (Surgeon Cell /LT (b) (6))

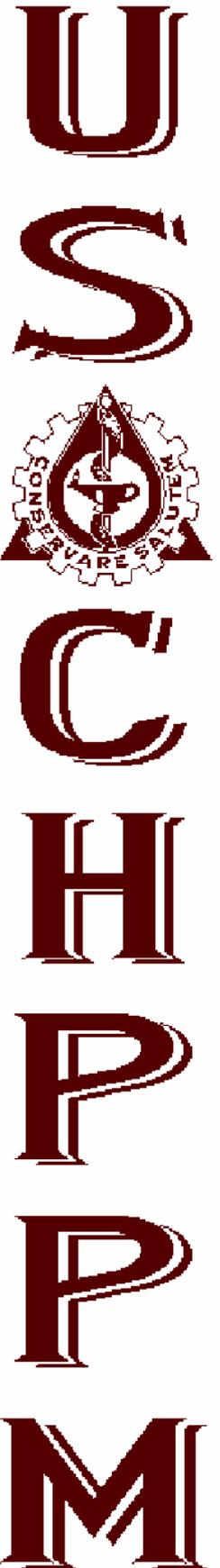
NAVCENT (Force Surgeon /Capt (b) (6))

NEHC (Plans and Operations /Mr. (b) (6))

CFLCC (Command Surgeon Office /MAJ (b) (6))

Readiness thru Health

U.S. Army Center for Health Promotion and Preventive Medicine



DEPLOYMENT OCCUPATIONAL AND ENVIRONMENTAL
HEALTH RISK CHARACTERIZATION
CAMP HURSO, ETHIOPIA
21 TO 23 FEBRUARY 2007
U_ETH_HURSO_CM_A10_20070223

CHPPM FORM 433-E (MCHP-CS-IPD), OCT 03

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Readiness Thru Health

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DEPLOYMENT OCCUPATIONAL AND ENVIRONMENTAL
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1. REFERENCES.

a. U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) Technical Guide (TG) 230, Chemical Exposure Guidelines for Deployed Military Personnel, Version 1.3, May 2003 with the January 2004 addendum.

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

2. PURPOSE. According to U.S. Department of Defense medical surveillance requirements, this occupational and environmental health (OEH) risk characterization documents the identification and evaluation of chemical hazards that pose potential health and operational risks to deployed troops. Specifically, the samples and information provided on the associated field data sheets were used to estimate the operational health risk associated with exposure to identified chemical hazards in the air at the above-mentioned location.

3. SCOPE. This evaluation addresses the analytical results for six ambient air samples collected from Camp Hurso, Ethiopia, 21 to 23 February 2007. These samples are limited in time, area, and media. Therefore, they should not be considered a complete assessment of the overall OEH hazards to which troops may be exposed at this location. However, this evaluation has been performed using operational risk management (ORM) doctrine FM 5–19 and the relatively conservative (protective) assumptions and methods provided in TG 230 to facilitate decision making that can minimize the likelihood of significant risks.

4. BACKGROUND AND EXPOSURE ASSUMPTIONS. The samples were collected to assess the potential for adverse health effects to troops routinely and continuously breathing the ambient air at Camp Hurso, Ethiopia. The samples were collected from various living and working areas throughout the camp. It was reported that the burn pit was burning during sample collections on 22 and 23 February 2007. No significant weather conditions were reported except for approximately 15 minutes of rain on 21 February 2007. No industry was active in the area at the time of sampling. Personnel are expected to remain at this location for less than 1 year. A conservative (protective) assumption is that all personnel inhale the ambient air for 24-hours/day for 365 days (1 year). In addition, it is assumed that control measures and/or personal protective equipment are not used.

5. METHOD.

a. General. The USACHPPM Deployment Environmental Surveillance Program (DESP) uses the TG 230 methodology and associated military exposure guidelines (MEGs) to assess identified hazards and estimate risk in a manner consistent with doctrinal risk management procedures and terminology. This method includes identification of the hazard(s), assessment of the hazard severity and probability, and determination of a risk estimate and associated level of confidence. As part of the hazard identification step, the long-term (1-year) MEGs are used as screening criteria to identify those hazards that are potential health threats. These 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 based on currently available data. Information about potential health effects are obtained from data provided with the exposure values used to derive the MEGs and symptoms reported from occupational exposures. The quality and quantity of dose and response information available varies with the hazard and the determination of a precise "no-effect" levels for low-level exposures for extended duration and involves professional judgment. Hazards with exposure concentrations greater than comparison levels are identified as potential health threats, carried through the hazard assessment process, and assigned a risk estimate consistent with ORM methodology. Hazards that are either not detected or are present only at levels below the 1-year MEGs are not considered health threats and, therefore, are automatically assigned a low-operational risk estimate.

b. Assessment of Particulate Matter. Particulate Matter (PM) is one of six air pollutants for which the U.S. Environmental Protection Agency (USEPA) has promulgated National Ambient Air Quality Standards (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 that are grouped according to the severity of health concerns. The USACHPPM uses the AQI categories to characterize the operational risk from PM. If any PM sample concentration is above the threshold of the AQI "good" quality air category, it is identified as a hazard. 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. 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 both healthy personnel, and those with pre-existing sensitivities. Hazard probability is based on the frequency that anticipated exposures are above a threshold that is representative of the hazard severity category.

6. HAZARD IDENTIFICATION.

a. Sample Information. Of the six samples collected, three were valid, and three were field blanks.

b. Laboratory Analysis. The samples were analyzed for particulate matter less than 10 micrometers in diameter (PM₁₀) and metals. Metals detected above the laboratory reportable limit were compared to the MEGs presented in TG 230, while the PM₁₀ concentrations were compared to the NAAQS. Appendix A provides a summary of the samples evaluated in this report. Appendix B contains a sample results summary table. Appendix C shows complete analytical results for the valid sample.

c. Assessment.

(1) Particulate matter (PM₁₀). Since PM₁₀ was measured at concentrations above the AQI “good” range, PM₁₀ is identified as a potential health threat requiring further evaluation. The PM air pollutants 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. The PM can include dust, silica, soil, metals, organic compounds, allergens, and compounds; for example, nitrates or sulfates that are formed by condensation or transformation of combustion exhaust. The PM chemical composition and size vary considerably depending on the source. Primary sources of PM₁₀ at the specified location are assumed to be windblown dust and sand and combustion from military open burning of waste materials conducted on site.

(2) Metals. No metals were detected at concentrations greater than their respective MEGs. Therefore, the OEH risk estimate for exposure to metals completed in the lab analysis in the ambient air at this location is considered **low**.

7. HAZARD ASSESSMENT.

a. Hazard Severity—PM₁₀. The average concentration of PM₁₀ was 121 micrograms per cubic meter (µg/m³). This concentration falls within the range of concentrations that are 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—PM₁₀. Although the average PM₁₀ 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 hazard probability reflects the likelihood that the exposures at the location are represented by the concentrations used to determine the hazard severity. The probability that the severity of a hazard is negligible is based on a comparison of individual sample concentrations to the PM₁₀ 24-hour NAAQS of 150 µg/m³. During this sampling event, the range of PM₁₀ concentrations was 80-161 µg/m³, and one of three (33 percent) samples was above 150 µg/m³. Since the assumption is that all or most personnel at this location are equally exposed to the ambient air, the probability that personnel will be exposed to PM₁₀ concentrations above 150 µg/m³ is considered **seldom**.

c. **Risk Estimate and Confidence.** The hazard severity and probability levels described above were used with the ORM matrix in TG 230, Table 3–3, or FM 5–19 to provide a risk estimate for exposure to each identified hazard. Table 1 summarizes the risk estimate for each identified hazard. The risk estimate for this location is considered **low**. The risk estimate for exposure to the ambient air at this location is based on the highest identified hazard risk estimate. According to TG 230, Table 3–5, “Example Criteria for Assigning Confidence Levels,” confidence in the risk estimate is considered **low** because only three samples were collected, and it is unclear if the samples represent conditions to which personnel are typically exposed for the deployment duration. In general, the confidence level in risk estimates is usually low to medium due to consistent lack of specific exposure information associated with troop movement and activity patterns; other routes/sources of potential OEH hazards not identified; and uncertainty regarding impacts of multiple chemicals present, particularly those affecting the same body organs/systems.

Table 1. Risk Estimate Summary for Exposure to Ambient Air Samples Collected from Camp Hurso, Ethiopia

Parameter	Hazard Severity	Hazard Probability	Hazard-Specific Risk Estimate	Operational Risk Estimate	Confidence
PM ₁₀	NEGLIGIBLE	SELDOM	LOW	LOW	LOW
Metals	No parameters detected above a MEG		LOW		

8. **CONCLUSION.** The OEH risk estimate for exposure to PM₁₀ and metals in the ambient air at Camp Hurso, Ethiopia is **low**. Confidence in the risk estimate is **low** because only three samples were collected, and it is unclear if the samples represent conditions to which personnel are typically exposed for the deployment duration. Exposure to the ambient air is expected to have little or no impact on unit readiness.

9. HAZARD CONTROLS/RECOMMENDATIONS AND NOTE.

a. Recommendations.

(1) Continue to collect samples from this location at least once every 6 days for the deployment duration (or as long as possible) to better characterize the PM₁₀ and metals ambient air concentrations to which personnel are typically exposed.

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

b. Note. This OEH risk assessment is specific to the exposure assumptions identified above and the sample results evaluated in this report. If the assumed exposure scenario changes, provide updated information so that the risk estimate can be re-evaluated. If additional samples from this site and/or area are collected, a new OEH risk assessment will be completed.

10. POINTS OF CONTACT. The USACHPPM points of contact for this assessment are Mr. (b) (6) and Mr. (b) (6). Mr. (b) (6) may be contacted at e-mail, (b) (6). Mr. (b) (6) may be contacted at e-mail, (b) (6), or DSN: (b) (6) or commercial (b) (6).

(b) (6)

Environmental Scientist
Deployment Environmental Surveillance
Program

Approved by:

(b) (6)

Acting Program Manager
Deployment Environmental Surveillance

APPENDIX A
SAMPLING SUMMARY

Table A-1. Summary for Three Ambient Air Samples Collected at Camp Hurso, Ethiopia 21 to 23 February 2007

Field Identification Number	DESP Identification Number	Sample Location	Collection Date	Filter Number	Sample Duration	Invalid Sample (Yes/No)	Field Notes
ETHHURSOPM10MV053	ETH_7437_PMMV_0753_01	ADJACENT TO QUARTERDECK	22-Feb-07	47-06-373	24	No	HUM. 54.6% BURN PIT BURNING AT START TIME HUM. 48% BURN PIT BURNING AT STOP TIME.
ETHHURSOPM10MV07052	ETH_7437_PMMV_0752_01	NEXT TO KBR WORK SHOP STORAGE BOX	21-Feb-07	47-06-369	24	No	RAINED FOR ABOUT 15 MIN HUM. 63% MINI VOL SHADED BY TREES HUM. 64.1%
ETHHURSOPM10MV07054	ETH_7437_PMMV_0754_01	WATER HOLDING TANKS	23-Feb-07	47-06-372	22	No	HUM. 45% BOTH BURN PITS BURNING HUM. 45.8% BURN PIT GOING

APPENDIX B

SAMPLE RESULTS SUMMARY

Table B-1. Results Summary for Three Ambient Air Samples Collected at Camp Hurso, Ethiopia, 21 to 23 February 2007

		Detection Rate		Concentration ($\mu\text{g}/\text{m}^3$)					1-hour		
Parameter detected above laboratory limit	Units	# detected / # samples	# detected above MEG / # samples	Maximum	Average	1-year	14-days	8-hours	Minimal	Severe	Significant
PM ₁₀	$\mu\text{g}/\text{m}^3$	3 / 3	3 / 3	162	121	50	No MEG	No MEG	No MEG	No MEG	No MEG

Notes:

No MEG – MEG not established.

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

APPENDIX C

DETAILED SAMPLE RESULTS

Table C-1. Analytical Results for Three Ambient Air Samples Collected at Camp Hurso, Ethiopia, 21 to 23 February 2007

Field ID			ETHHURSOPM10MV053	ETHHURSOPM10MV07052	ETHHURSOPM10MV07054
DESP ID			ETH_7437_PMMV_0753_01	ETH_7437_PMMV_0752_01	ETH_7437_PMMV_0754_01
Location			HURSO	HURSO	HURSO
Collection Date			22-Feb-07	21-Feb-07	23-Feb-07
Collection Time			9:48	8:51	10:38
Parameter	Chemical Abstract Number	Units	Concentration	Concentration	Concentration
PM ₁₀		µg/m ³	121	162	80
Antimony	7440360	µg/m ³	< 0.1405	< 0.1410	< 0.1522
Beryllium	7440417	µg/m ³	< 0.0702	< 0.0705	< 0.0761
Cadmium	7440439	µg/m ³	< 0.0702	< 0.0705	< 0.0761
Chromium	7440473	µg/m ³	< 0.0702	< 0.0705	< 0.0761
Lead	7439921	µg/m ³	< 0.1405	< 0.1410	< 0.1522
Manganese	7439965	µg/m ³	< 0.2811	< 0.2820	< 0.3045
Nickel	7440020	µg/m ³	< 0.0702	< 0.0705	< 0.0761
Total Arsenic	7440382	µg/m ³	< 0.0702	< 0.0705	< 0.0761
Vanadium	7440622	µg/m ³	< 0.2811	< 0.2820	< 0.3045
Zinc	7440666	µg/m ³	< 0.7028	< 0.7050	< 0.7613

Notes:

< X.XX – Below laboratory detection limit (X.XX).

Laboratory detection limit is parameter and sample specific.