APPENDIX F

Executive Summary: Screening Health Risk Assessment, Burn Pit Exposures, Balad Air Base, Iraq

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SCREENING HEALTH RISK ASSESSMENT
BURN PIT EXPOSURES
BALAD AIR BASE, IRAQ
USACHPPM REPORT NO. 47-MA-08PV-08/
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1. PURPOSE. This report documents the results of ambient air sampling conducted at Balad Air Base, Iraq by on-site military environmental health personnel. The ambient air sampling was intended to collect multiple classes of pollutants expected to be emitted by the Air Base municipal waste open burn pit, which operated 24 hours (hrs), 7-days per week. The results of the ambient air sampling will provide the foundation for a screening health risk assessment (HRA) of military personnel located at the site and likely exposed to these pollutants. The ambient sampling relied upon for this report was performed 2 January 2007 through 21 April 2007, prior to the operation of on-site incinerators. Subsequent air sampling will be conducted following the installation and operation of multiple municipal waste incinerators. No incinerators were operational during this sampling period.

2. CONCLUSIONS.

a. The U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) and the U.S. Air Force Institute for Operational Health (AFIOH) have jointly developed a screening HRA documenting the current understanding of the health risk from burn pit operations at Balad Air Base, Iraq. Findings indicate that measured exposure levels from burn pit operations are not routinely above deployment military exposure guidelines (MEGs) for exposures up to 1 year. The MEGs, as published in USACHPPM Technical Guide (TG) 230, (*Chemical Exposure Guidelines for Deployed Military Personnel*), represent chemical concentrations above which certain types of health effects may begin to occur in individuals within an exposed population after a continuous, single exposure of specified duration. The MEGs are not designed for determining casualty estimates but are instead used as preventive guidelines. The occupational and environmental health (OEH) risk estimate for exposure to all substances sampled for in the ambient air (except particulate matter particles of 10 micrometers or less (PM_{10}) at Balad Air Base indicates adverse health risks are unlikely. These levels are not likely to cause short-term onset health effects.

b. In addition, a human HRA was performed under guidance outlined by the U.S. Environmental Protection Agency (U.S. EPA). Cancer (carcinogenic) and non-cancer (or non-carcinogenic, which means any health effect other than cancer) risk estimates were developed. These results indicate an "acceptable" health risk for both cancer and non-cancer long-term health effects. This methodology and resulting estimates do not indicate an absolute measure of an individual's probability of an adverse health effect. Instead, the results indicate the likelihood

that such outcomes (longer term/delayed cancer or non-cancer health effects) might occur under very specific exposure conditions.

c. Dioxins were evaluated separately for non-cancer risks since they do not have the "toxicity value" from U.S. EPA needed for that methodology. Using a model to estimate body-burden level (build up of dioxins in the body), the burn pit has minimal impact on body-burden level. A pilot serum study supports this finding.

d. A software error resulting from an improperly programmed access database in the initial reporting of sample results for dioxin congeners produced results which were 1,000 times greater than the measured value. Consequently, initial draft reports, to include a document released on 3 December 2007 titled "Balad Burn Pit Interim Report—Executive Summary," significantly overestimated the carcinogenic risk to personnel. As noted above, revised estimates for carcinogenic and non-carcinogenic effects find the health risk levels "acceptable" by U.S. EPA guidelines for long-term exposure. These results reflect conditions through June 2007, upon which two incinerators became operational and are expected to reduce contaminant levels.

e. This report is based on the results of a comprehensive air sampling effort conducted by U.S. Air Force Bioenvironmental Engineering and U.S. Army preventive medicine personnel in the first four months of 2007. The air sampling study targeted expected emissions from the burn pit to include particulate matter, volatile organics, metals, polycyclic aromatic hydrocarbons, and polychlorodibenzodioxins/furans (hereafter called "dioxins" and "furans"). Sampling locations were selected to represent typical and maximum exposure levels for the general population serving at Balad Air Base. The samples were also collected over multiple 24-hour periods to account for some of the operational and meteorological variability in exposure levels. A total of 163 samples were collected, resulting in 4811 individual analyte results. The 1-year MEGs were exceeded in 52 samples, to include 50 samples for particulate matter less than 10 (PM_{10}) microns in size and two samples for volatile organic compounds. Particulate matter levels were typical of what would be expected in the region and similar to background levels. Testing results do not indicate that PM_{10} was significantly increased by burn pit operations. Particulate matter exposure in the U.S. Central Command (USCENTCOM) region has been previously identified as a potential health concern and is being addressed in other studies. Results from the particulate matter were not evaluated as part of this assessment.

f. Despite the comprehensive sampling effort, there is significant uncertainty about actual exposure levels and the associated health risk estimates for those who currently are or have been assigned to Balad Air Base. Therefore, the exposure scenario was performed using a worse-case scenario approach and most individual exposures and resulting risks are expected to be less than predicted. Contaminant concentrations and related exposure levels are highly variable due to changing meteorological conditions (such as, wind direction and speed), differences in amount and type of material burned, as well as the temperature at which the material is burned. The risk assessment in this report conservatively assumed air sample results were representative of daily

exposure, continuous, and stable burn pit operations and that the base population remained constant.

g. Continued work by preventive medicine personnel in the U.S. Air Force and U.S. Army will be aimed at protecting the health of all Service members and reducing the level of uncertainty in these estimates. Any significant refinement that improves the precision of the estimate will be shared with Balad Air Base and USCENTCOM leadership as they are obtained.

3. RECOMMENDATIONS. The following recommendations should be considered in the development of an action plan to reduce any future burn pit exposures at Balad Air Base and at other locations in USCENTCOM area of responsibility. These include the following:

a. Reduce or eliminate the open burning of plastic materials. The main source of ambient levels of dioxins and furans is low-temperature burning plastic materials, especially in the presence of metal catalysts. These conditions typify open pit burning operations.

b. Assess effectiveness of control measures. Assess air pollution levels at Balad Air Base after controls are implemented. Air sampling should be performed to ensure that recommended control measures for reducing exposure levels to personnel are implemented and working.

c. Develop a risk communication plan. A risk communication plan, to include both information products and open discussion opportunities, should be developed. Appropriate risk communication products, such as fact sheets for Service members and commanders, should be disseminated to communicate the results of any HRAs and potential plans for determining the meaning of the results. While information products can be helpful in increasing understanding, open discussion opportunities are proven to help minimize unnecessary concerns by outwardly reinforcing leadership focus on Force Health Protection; clarifying misinformation/ misperceptions; and by ensuring that decision makers remain cognizant of nonexperts' interests, values, and concerns.

d. Conduct a policy review. Recommend Force Health Protection and Readiness, Joint Staff, and Under Secretary of Defense (Acquisition, Technology and Logistics) conduct a comprehensive policy review concerning proper use of burn pits and develop new policies to fill any gaps.

e. Force Health Protection and Readiness coordinated with the Defense Health Board (DHB) to review the updated USACHPPM/AFIOH Balad screening health risk assessment and corresponding calculations for health risks for individuals deployed to Balad Air Base. The DHB remarks were documented in a Memorandum, Defense Health Board (DHB), subject: Defense Health Board Findings Pertaining to Final "Draft Health Risk Assessment, Burn Pit Exposures, Balad Air Base, Iraq". The Board concluded "given the data available, the screening risk assessment provides an accurate determination of airborne dioxin exposure levels for service members deployed to Balad Air Base. Based on the information provided, no dioxin-associated

significant short- or long-term, health risks or elevated cancer risks are anticipated among the personnel deployed to Balad, Iraq."

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